

PCT INTERNATIONAL COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 09 February 2000 (09.02.00)	
International application No. PCT/AU99/00576	Applicant's or agent's file reference 49336PCT DL
International filing date (day/month/year) 16 July 1999 (16.07.99)	Priority date (day/month/year) 16 July 1998 (16.07.98)
Applicant NGO, Get, Sen et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

17 December 1999 (17.12.99)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer Juan Cruz</p> <p>Telephone No.: (41-22) 338.83.38</p>
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PCT INTERNATIONAL COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

COLLISON & CO.
117 King William Street
Adelaide, S.A. 5000
AUSTRALIE

Date of mailing (day/month/year) 02 March 2000 (02.03.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 49336PCT DL	
International application No. PCT/AU99/00576	International filing date (day/month/year) 16 July 1999 (16.07.99)

1. The following indications appeared on record concerning: <input checked="" type="checkbox"/> the applicant <input type="checkbox"/> the inventor <input type="checkbox"/> the agent <input type="checkbox"/> the common representative		
Name and Address UNITED TECHNOLOGY PTY. LTD. 239 Magill Road Maylands, S.A. 5067 Australia	State of Nationality AU	State of Residence AU
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning: <input type="checkbox"/> the person <input checked="" type="checkbox"/> the name <input type="checkbox"/> the address <input type="checkbox"/> the nationality <input type="checkbox"/> the residence		
Name and Address EHOME CORPORATION PTY LIMITED 239 Magill Road Maylands, S.A. 5067 Australia	State of Nationality AU	State of Residence AU
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	
3. Further observations, if necessary:		
4. A copy of this notification has been sent to: <input checked="" type="checkbox"/> the receiving Office <input type="checkbox"/> the designated Offices concerned <input type="checkbox"/> the International Searching Authority <input checked="" type="checkbox"/> the elected Offices concerned <input checked="" type="checkbox"/> the International Preliminary Examining Authority <input type="checkbox"/> other:		

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Mougamadou ABIDINE Telephone No.: (41-22) 338.83.38
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PCT INTERNATIONAL COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

LESICAR, Perrin
168 South Terrace
Adelaide, S.A. 5000
AUSTRALIE

Date of mailing (day/month/year) 18 September 2000 (18.09.00)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 49336PCT DL	
International application No. PCT/AU99/00576	International filing date (day/month/year) 16 July 1999 (16.07.99)

1. The following indications appeared on record concerning:

☐ the applicant ☐ the inventor ☒ the agent ☐ the common representative

Name and Address

COLLISON & CO.
117 King William Street
Adelaide, S.A. 5000
Australia

State of Nationality

State of Residence

Telephone No.

08 82123133

Facsimile No.

08 82311273

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address

LESICAR, Perrin
168 South Terrace
Adelaide, S.A. 5000
Australia

State of Nationality

State of Residence

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input checked="" type="checkbox"/> other: COLLISON & CO.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Mougamadou ABIDINE

Telephone No.: (41-22) 338.83.38

PCT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

LESICARPERRIN
168 South Terrace
Adelaide, S.A. 5000
AUSTRALIE

Date of mailing (day/month/year) 11 January 2001 (11.01.01)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 49336PCT DL	
International application No. PCT/AU99/00576	International filing date (day/month/year) 16 July 1999 (16.07.99)

1. The following indications appeared on record concerning:

☐ the applicant ☐ the inventor ☒ the agent ☐ the common representative

Name and Address LESICAR, Perrin 168 South Terrace Adelaide, S.A. 5000 Australia	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☐ the address ☐ the nationality ☐ the residence

Name and Address LESICARPERRIN 168 South Terrace Adelaide, S.A. 5000 Australia	State of Nationality	State of Residence
	Telephone No. 61 8 8211 9422	
	Facsimile No. 61 8 8221 9433	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Jean-Marie McAdams Telephone No.: (41-22) 338.83.38
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REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference (if desired) (12 characters maximum) 49336PCT DL

Box No. I TITLE OF INVENTION

INTERNET UTILITY INTERCONNECT METHOD AND MEANS

Box No. II APPLICANT

Name and address: (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

UNITED TECHNOLOGY PTY LTD
239 MAGILL ROAD
MAYLANDS, SOUTH AUSTRALIA 5067
AUSTRALIA

☐ This person is also inventor

Telephone No.
08 83628175

Facsimile No.
08 83628174

Teleprinter No.

State (that is, country) of nationality:

AUSTRALIAN

State (that is, country) of residence:

AUSTRALIA

This person is applicant for the purposes of:

☐ all designated States

☒ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

NGO, GET SEN
9-3 ORANGE LANE
NORWOOD, SOUTH AUSTRALIA 5067
AUSTRALIA

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

AUSTRALIA

State (that is, country) of residence:

AUSTRALIA

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name, for a legal entity, full official designation. The address must include postal code and name of country.)

COLLISON & CO
117 KING WILLIAM STREET
ADELAIDE, SOUTH AUSTRALIA 5000
AUSTRALIA

Telephone No.
08 82123133

Facsimile No.
08 82311273

Teleprinter No.

Address for correspondence: Mark this check-box where no agent or common representative has been appointed and the applicant(s) intend to indicate a second address to which correspondence should be sent.

1993

1993

Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

PARSONS, EWAN
239 MAGILL ROAD
STEPNEY, SOUTH AUSTRALIA 5067
AUSTRALIA

This person is:

- ☐ applicant only
☒ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below)

State (that is, country) of nationality:

AUSTRALIAN

State (that is, country) of residence:

AUSTRALIA

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

- ☐ applicant only
☐ applicant and inventor
☐ inventor only (If this check-box is marked, do not fill in below)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

- ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

Box No. V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes: at least one must be marked):

Regional Patent

- ☒ AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|--|--|
| <input checked="" type="checkbox"/> AL Albania | <input checked="" type="checkbox"/> LS Lesotho |
| <input checked="" type="checkbox"/> AM Armenia | <input checked="" type="checkbox"/> LT Lithuania |
| <input checked="" type="checkbox"/> AT Austria | <input checked="" type="checkbox"/> LU Luxembourg |
| <input checked="" type="checkbox"/> AU Australia | <input checked="" type="checkbox"/> LV Latvia |
| <input checked="" type="checkbox"/> AZ Azerbaijan | <input checked="" type="checkbox"/> MD Republic of Moldova |
| <input checked="" type="checkbox"/> BA Bosnia and Herzegovina | <input checked="" type="checkbox"/> MG Madagascar |
| <input checked="" type="checkbox"/> BB Barbados | <input checked="" type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> BG Bulgaria | <input checked="" type="checkbox"/> MN Mongolia |
| <input checked="" type="checkbox"/> BR Brazil | <input checked="" type="checkbox"/> MW Malawi |
| <input checked="" type="checkbox"/> BY Belarus | <input checked="" type="checkbox"/> MX Mexico |
| <input checked="" type="checkbox"/> CA Canada | <input checked="" type="checkbox"/> NO Norway |
| <input checked="" type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input checked="" type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CN China | <input checked="" type="checkbox"/> PL Poland |
| <input checked="" type="checkbox"/> CU Cuba | <input checked="" type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> CZ Czech Republic | <input checked="" type="checkbox"/> RO Romania |
| <input checked="" type="checkbox"/> DE Germany | <input checked="" type="checkbox"/> RU Russian Federation |
| <input checked="" type="checkbox"/> DK Denmark | <input checked="" type="checkbox"/> SD Sudan |
| <input checked="" type="checkbox"/> EE Estonia | <input checked="" type="checkbox"/> SE Sweden |
| <input checked="" type="checkbox"/> ES Spain | <input checked="" type="checkbox"/> SG Singapore |
| <input checked="" type="checkbox"/> FI Finland | <input checked="" type="checkbox"/> SI Slovenia |
| <input checked="" type="checkbox"/> GB United Kingdom | <input checked="" type="checkbox"/> SK Slovakia |
| <input checked="" type="checkbox"/> GD Grenada | <input checked="" type="checkbox"/> SL Sierra Leone |
| <input checked="" type="checkbox"/> GE Georgia | <input checked="" type="checkbox"/> TJ Tajikistan |
| <input checked="" type="checkbox"/> GH Ghana | <input checked="" type="checkbox"/> TM Turkmenistan |
| <input checked="" type="checkbox"/> GM Gambia | <input checked="" type="checkbox"/> TR Turkey |
| <input checked="" type="checkbox"/> HR Croatia | <input checked="" type="checkbox"/> TT Trinidad and Tobago |
| <input checked="" type="checkbox"/> HU Hungary | <input checked="" type="checkbox"/> UA Ukraine |
| <input checked="" type="checkbox"/> ID Indonesia | <input checked="" type="checkbox"/> UG Uganda |
| <input checked="" type="checkbox"/> IL Israel | <input checked="" type="checkbox"/> US United States of America |
| <input checked="" type="checkbox"/> IN India | <input checked="" type="checkbox"/> UZ Uzbekistan |
| <input checked="" type="checkbox"/> IS Iceland | <input checked="" type="checkbox"/> VN Viet Nam |
| <input checked="" type="checkbox"/> JP Japan | <input checked="" type="checkbox"/> YU Yugoslavia |
| <input checked="" type="checkbox"/> KE Kenya | <input checked="" type="checkbox"/> ZW Zimbabwe |
| <input checked="" type="checkbox"/> KG Kyrgyzstan | |
| <input checked="" type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input checked="" type="checkbox"/> KR Republic of Korea | |
| <input checked="" type="checkbox"/> KZ Kazakhstan | |
| <input checked="" type="checkbox"/> LC Saint Lucia | |
| <input checked="" type="checkbox"/> LK Sri Lanka | |
| <input checked="" type="checkbox"/> LR Liberia | |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☒ AE United Arab Emirates
- ☒ ZA South Africa
- ☐

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

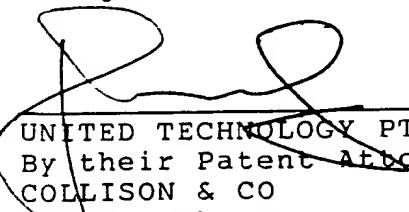
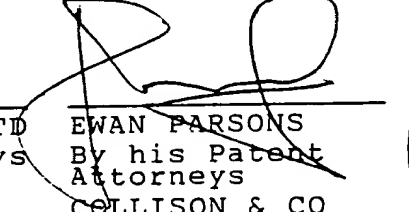
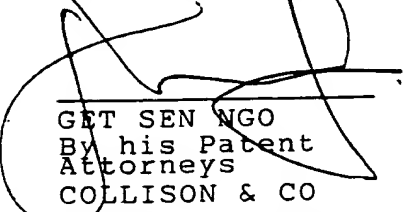
Box No. VI PRIORITY CLAIM		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box.		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application: regional Office	international application: receiving Office
item (1) 16.07.98 16th July 1998	PP4710	Australia		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): 1

* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

Box No. VII INTERNATIONAL SEARCHING AUTHORITY			
Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):		Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):	
ISA /		Date (day/month/year)	Number Country (or regional Office)

Box No. VIII CHECK LIST; LANGUAGE OF FILING	
This international application contains the following number of sheets: request : 4 description (excluding sequence listing part) : 19 claims : 3 abstract : 1 drawings : 7 sequence listing part of description : Total number of sheets : 34	This international application is accompanied by the item(s) marked below: 1. <input checked="" type="checkbox"/> fee calculation sheet 2. <input type="checkbox"/> separate signed power of attorney 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: 4. <input type="checkbox"/> statement explaining lack of signature 5. <input type="checkbox"/> priority document(s) identified in Box No. VI as item(s): 6. <input type="checkbox"/> translation of international application into (language): 7. <input type="checkbox"/> separate indications concerning deposited microorganism or other biological material 8. <input type="checkbox"/> nucleotide and/or amino acid sequence listing in computer readable form 9. <input type="checkbox"/> other (specify):
Figure of the drawings which should accompany the abstract: 1	Language of filing of the international application: ENGLISH

Box No. IX SIGNATURE OF APPLICANT OR AGENT		
<small>Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).</small>		
 UNITED TECHNOLOGY PTY LTD By their Patent Attorneys COLLISON & CO Howard Schulze	 EWAN PARSONS By his Patent Attorneys COLLISON & CO Howard Schulze	 GET SEN NGO By his Patent Attorneys COLLISON & CO Howard Schulze

For receiving Office use only	
1. Date of actual receipt of the purported international application: 3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application: 4. Date of timely receipt of the required corrections under PCT Article 11(2): 5. International Searching Authority (if two or more are competent): ISA /	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received: 6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid.

For International Bureau use only
Date of receipt of the record copy by the International Bureau:

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Collison & Co
GPO Box 2556
ADELAIDE SA 5001

PCT

WRITTEN OPINION

(PCT Rule 66)

31 MAR 00

Applicant's or agent's file reference
49336PCT DL/REC

Date of mailing (day/month/year) **31 JAN 2000**

REPLY DUE within **two months**
from the above date of mailing

International application No.
PCT/AU 99/00576

International filing date (day/month/year)
16 July 1999

Priority Date (day/month/year)
16 July 1998

International Patent Classification (IPC) or both national classification and IPC

Int. Cl.⁶ G05B 15/00, G05B 19/418, G08C 19/00.

Applicant

United Technology Pty Ltd et al.

1. This written opinion is the **first** drawn by this International Preliminary Examining Authority.
2. This opinion contains indications relating to the following items:

I	<input checked="" type="checkbox"/>	Basis of the opinion
II	<input type="checkbox"/>	Priority
III	<input type="checkbox"/>	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/>	Lack of unity of invention
V	<input checked="" type="checkbox"/>	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/>	Certain documents cited
VII	<input type="checkbox"/>	Certain defects in the international application
VIII	<input type="checkbox"/>	Certain observations on the international application
3. The applicant is hereby **invited to reply** to this opinion.


When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.
4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: **16 November 2000**

Name and mailing address of the IPEA/AU
AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaaustralia.gov.au
Facsimile No. (02) 6285 3929

Authorized Officer

SEAN APPEGATE
Telephone No. (02) 6283 2207

I. Basis of the opinion**1. With regard to the elements of the international application:***

- ☒ the international application as originally filed.
- ☐ the description, pages , as originally filed,
 pages , filed with the demand,
 pages , filed with the letter of .
- ☐ the claims, pages , as originally filed,
 pages , as amended under Article 19,
 pages , filed with the demand,
 pages , filed with the letter of .
- ☐ the drawings, pages , as originally filed,
 pages , filed with the demand,
 pages , filed with the letter of .
- ☐ the sequence listing part of the description:
 pages , as originally filed
 pages , filed with the demand
 pages , filed with the letter of .

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/fig.

5. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

** Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed"*

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 7, 16	YES
	Claims 1-6, 8-15, 17	NO
Inventive step (IS)	Claims None	YES
	Claims 1-17	NO
Industrial applicability (IA)	Claims 1-17	YES
	Claims None	NO

2. Citations and explanations

- (a) AU 36117/97 (Lextron Inc) 5 March 1998.
- (b) EP 825506 (Foxboro Corp) 25 February 1998.
- (c) EP 822473 (Canon Kabushiki Kaisha) February 1998.
- (d) WO 96/36953 (P-Serv Technologies) 21 November 1996.
- (e) WO 96/18982 (Delaney) 20 June 1996.

The invention defined in claims 1-6, 8-15 and 17 is not novel, and claims 1-17 lack an inventive step, when variously compared with documents (a) to (e) above.

Document (a) discloses an animal feedlot management system comprising a number of different subsystems, such as a feedmill system, a feedlot system, a feedbunk system and delivery vehicle systems, all connected via an internet based network. Each vehicle's on-board computer subsystem has a wireless link to the communications system for accessing a real time model of the feedlot maintained at a number of internet sites, one for each feedlot computer system. The model is continually updated from sources such as the feedlots and the vehicle subsystems. The status of items such as the vehicles, feed meters and scales may be remotely monitored and controlled from a centralized workstation. This document discloses all of the features defined in claims 1-4, 6, 8, 10-15 and 17, and renders claims 5 and 9 not inventive.

Document (b) discloses a system for remote process control in which a server data processor, a control/sensing device (such as a thermocouple, environmental controller etc) and interfacing equipment are connected via a cable and/or wireless network such as the internet to a client data processor. The client requests and receives an applet from the server so as to monitor and control the device. This document discloses all of the features defined in claims 1-3, 6, 11-15 and 17, and renders claims 4, 5, 8-10 and 16 not inventive.

Document (c) discloses a system for remote maintenance of industrial equipment in which the operating state of equipment is monitored and if necessary communicated via the internet to a centralized management system, which may then send back automatic countermeasure instructions. This document discloses all of the features of claims 1-6, 11-15 and 17, and renders claims 8-10 not inventive.

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: V

Document (d) discloses a system for wirelessly controlling electrical equipment in which multiple appliances have individual servers which are in communication with a central control station, which may be accessed remotely by a user via cable, such as telephone lines. All other connections may be wireless - electrical or optical. This document discloses all of the features of claims 1, 11-13, and renders claims 2-10, 14-17 not inventive.

Document (e) discloses a system for remotely gathering consumption data from power meters. Readers obtain consumption information from the meters and provide it to microprocessors for storage. Periodically a radio frequency polling message is transmitted from the server to each meter location, and after error and identification checks the requested data is returned. The server also automatically scans radio frequencies to measure traffic and noise levels so as to create a hop map. The hop map and switch over time are transmitted to the meter systems to alter their communication status. This discloses all of the features of claims 1-5, 8, 9, 11-13, and renders claims 7 and 10 not inventive.

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PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)


REC'D 07 NOV 2000

WIPO

PCT

Applicant's or agent's file reference 10317pct	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International application No. PCT/AU99/00576	International filing date (day/month/year) 16 July 1999	Priority Date (day/month/year) 16 July 1998
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ G05B 15/00, G05B 19/418, G08C 19/00		
Applicant EHOME CORPORATION PTY LIMITED et al		

1.	This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of 3 sheets, including this cover sheet. <input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT). These annexes consist of a total of 23 sheet(s).
3.	This report contains indications relating to the following items: I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application

Date of submission of the demand 17 December 1999	Date of completion of the report 26 October 2000
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustalia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer  SEAN APPEGATE Telephone No. (02) 6283 2207

I. Basis of the report1. With regard to the **elements** of the international application:*☐ the international application as originally filed.☒ the description, pages , as originally filed,
pages , filed with the demand,
pages 1-18 , received on 24 March 2000 with the letter of 24 March 2000☒ the claims, pages , as originally filed,
pages , as amended (together with any statement) under Article 19,
pages , filed with the demand,
pages 19-23 , received on 19 October 2000 with the letter of 19 October 2000☒ the drawings, pages 1/7-7/7 , as originally filed,
pages , filed with the demand,
pages , received on with the letter of☐ the sequence listing part of the description:
pages , as originally filed
pages , filed with the demand
pages , received on with the letter of2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).☐ the language of publication of the international application (under Rule 48.3(b)).☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, was on the basis of the sequence listing:☐ contained in the international application in written form.☐ filed together with the international application in computer readable form.☐ furnished subsequently to this Authority in written form.☐ furnished subsequently to this Authority in computer readable form.☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished4. ☐ The amendments have resulted in the cancellation of:☐ the description, pages☐ the claims, Nos.☐ the drawings, sheets/fig.5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

** Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. Statement**

Novelty (N)	Claims 1-26	YES
	Claims None	NO
Inventive step (IS)	Claims 1-26	YES
	Claims None	NO
Industrial applicability (IA)	Claims 1-26	YES
	Claims None	NO

2. Citations and explanations (Rule 70.7)

- (a) AU 36117/97 (Lextron Inc.) 5 March 1998.
- (b) EP 825506 (Foxboro Corp.) 25 February 1998.
- (c) EP 822473 (Canon Kabushiki Kaisha) February 1998.
- (d) WO 96/36953 (P-Serv Technologies) 21 November 1996.
- (e) WO 96/18982 (Delaney) 20 June 1996.

The remote control and monitoring system defined in claims 1-26 satisfies the requirements of novelty and inventive step when compared with documents (a) to (e) above. None of these documents when considered alone or in obvious combination clearly disclose all of the features defined in the claims, in particular the memory of the second control means which maintains the status of the apparatus and is only updated when the status has been altered.



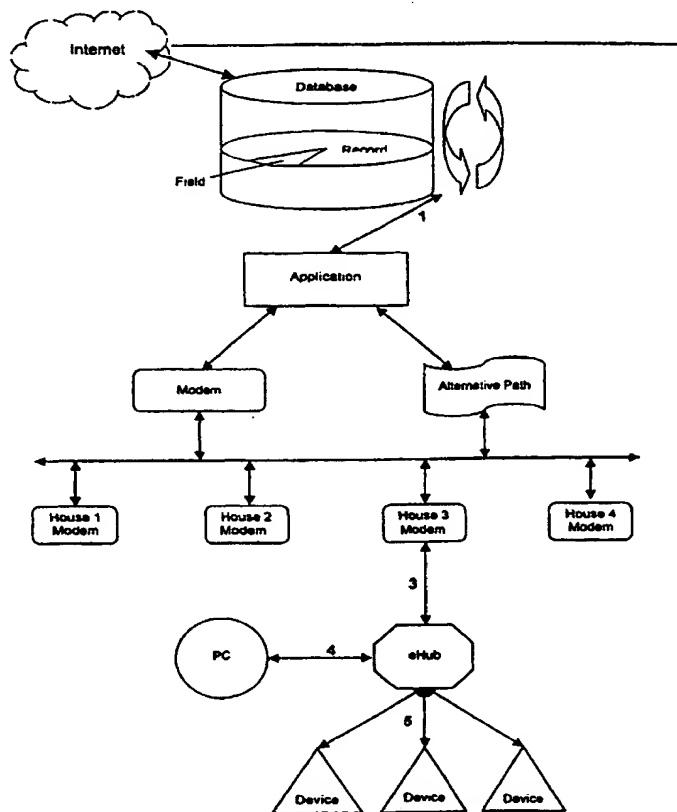
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/AU99/00576 (22) International Filing Date: 16 July 1999 (16.07.99) (30) Priority Data: PP 4710 16 July 1998 (16.07.98) AU (71) Applicant (for all designated States except US): UNITED TECHNOLOGY PTY. LTD. [AU/AU]; 239 Magill Road, Maylands, S.A. 5067 (AU). (72) Inventors; and (75) Inventors/Applicants (for US only): NGO, Get, Sen [AU/AU]; 9-3 Orange Lane, Norwood, S.A. 5067 (AU). PARSONS, Ewan [AU/AU]; 239 Magill Road, Stepney, S.A. 5067 (AU). (74) Agent: COLLISON & CO.; 117 King William Street, Adelaide, S.A. 5000 (AU).		(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report.	

(54) Title: INTERNET UTILITY INTERCONNECT METHOD AND MEANS

(57) Abstract

The present invention relates to a method and apparatus allowing for the monitoring and control of electrical appliance or utilities. This is achieved by using a master webserver that can communicate with remote slave nodes using a protocol for control and automation over networks of different media including wire, radio, microwave and powerlines. This Virtual Internet Link (VIL) responds to requests from the server and remotes to replicate information as though the remote node is connected to the Internet. The virtual link is used for remote information reading as well as home automation and security reflected in the master server. Remote nodes act on the Internet database information through a master/slave/exception protocol supporting automation, metering, security, e-cash transfers and Internet back-channel requests.



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422 Rec'd PCT/PTO 19 OCT 2000

Internet utility interconnect method and means

FIELD OF THE INVENTION

5

The present invention relates to a method and an apparatus employing said method providing a virtual link interconnecting on-line database records to automation apparatus.

10 BACKGROUND OF THE INVENTION

It is well known to control or access a variety of apparatus in a home or a commercial environment through an electronic network, whether that be through existing telecommunication lines; by radio control or through
15 electrical supply lines. One of the more common uses is to access various utilities, such as electrical or gas meters, or security apparatus. To achieve this, it is necessary to have an intelligent controlling means in the home or commercial environment that can be externally accessed to allow for immediate control or access to various apparatus. The difficulty with this is
20 that to ensure one can effectively have access into the home or commercial environment, a dedicated connection into the home or commercial environment is necessary. The infrastructure necessary as well as the expense of a dedicated communication line is prohibitive to most users and utilities.

25

It is an object of the present invention to overcome at least some of the abovementioned problems or to provide the public with a useful alternative. This is achieved by providing a method and apparatus for a virtual link interconnecting on-line database records to automation apparatus and that is
30 adapted to use different types of message protocols.

SUMMARY OF THE INVENTION

Therefore in one form of the invention there is proposed a system for the
35 remote control of at least one electrical apparatus said system including:
a first control means adapted to communicate with said apparatus;
a second control means adapted to communicate with said first

control means;

said second control means including a dynamic memory storing information about the status of said electrical apparatus and including an input means enabling said status to be altered, wherein when said status has
5 been altered the second control means communicates said new status to said first control means which subsequently checks the status of said apparatus and alters it if necessary to be the same as the new communicated status.

In a further form of the invention there is proposed a system for the remote
10 access of at least one utility meter said system including:

a first control means adapted to communicate with said meter;

a second control means adapted to communicate with said first control means;

said second control means including a dynamic memory storing
15 information about the status of said meter wherein said status is updated by the first control means communicating said new status to said second control means.

Preferably said information is security protected from access by unauthorised persons. This can be achieved by well known password and computer
20 software protection techniques.

Preferably said meter information is further accessible by the appropriate utility authority through said second control means. Thus, for example, the gas company may be able to access information about the use of gas at a property and can use that data for charging the customer. In addition, control
25 of the meter may allow the gas company to shut down the flow of gas as may be necessary in an emergency or during period of high demand. There could however be a proviso for a user to override the utility companies control.

Preferably said second control means communicates to said first control means via the Internet. Since the Internet is already a well established
30 network with known protocols and security and is accessible from almost anywhere in the world this allows a user to control their own appliances in the home from virtually anywhere whilst providing appropriate security.

Alternatively the second control means communicates with said first control means via an electrical power distribution means. In addition, the
35 communication may be through any means such as cellular phone, radio

network and the like.

Preferably said second control means receives regular status updates from said first controller. These updates preferably occur at regular pre-determined temporal intervals. For example, the system could be updated
5 every 30 minutes. The update time could also change according to the time of day and the like. Thus, at night, the system may need to update only every couple of hours whereas during the day it may occur at intervals of even a few minutes.

Preferably said updates occur continuously.

10 In preference said status includes information such as control information, management information and service information of said apparatus. This then allows the user to know all of the information that is available.

In preference first control means is a microprocessor. This means that a home user does not need to provide for a computer to control their appliance.
15 It can be a simple electronic microprocessor which obviously reduces the cost significantly and avoids the necessity to provide not only support for the home computer but continual upgrades.

In preference second control means is a computer server. This a single server could provide use for thousands of home users. Preferably said
20 information is a home page on said server which is easily accessible through the Internet.

In a yet further form of the invention there is proposed a management apparatus for electrical apparatus including:

25 a sensor on said apparatus communicating information about said apparatus to a microprocessor;

said microprocessor adapted to communicate with a server, said server accessible through communication including the Internet and having a database which changes based on received and analysed operation of said apparatus and which enables control of said apparatus.

30 In a still further form of the invention there is proposed a household electrical appliance controller including;

a controller associated with each said appliance providing status and control information of each electrical appliance;

said controller adapted to communicate with a server accessible through the Internet, said server including a homepage displaying said status information and enabling control of said electrical appliance through said controller.

- 5 A In a still further from of the invention there is proposed a method of monitoring and controlling a plurality of apparatus through the Internet including:
- controlling and monitoring said apparatus by a microprocessor, accessing said microprocessor through a communication network
- 10 from a server accessible on the Internet;
- providing said server with a homepage with updated information from said microprocessor; and
- changing said homepage which results in said server communicating said change to said microprocessor which in turn changes
- 15 said status of said apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

- To assist in understanding the invention reference is made to the following
- 20 figures in which;

Figure 1 is a flow chart of the method of the present invention;

- Figure 2 is a schematic diagram of a network employing the invention;
- 25

Figure 3 is a schematic diagram of the invention in conjunction with security arrangements;

- Figure 4 is a schematic diagram showing the broad concept of the invention when used by utilities;
- 30

Figure 5 is a typical on-screen display that may be used by a home owner;

- Figure 6 is a typical on-screen display in relation to an environment control centre; and
- 35

Figure 7 is a typical on-screen display in relation to a security control centre.

BEST MODES OF CARRYING OUT THE INVENTION

To further assist in understanding the invention reference is made to the
5 following descriptions which should be read in conjunction with the
accompanying drawings.

Intranet protocol

10 The invention relates to a method and an apparatus employing that
method wherein a master webserver is connected to remote slave
nodes using an appropriate protocol for control and automation over
networks of different media including wire, radio, microwave and
powerlines.

15 The arrangement that acts like a virtual Internet link (VIL) which
therefore responds to requests from the server and remotes to replicate
information as though the remote node is connected to the Internet. The
virtual link can be used for remote information reading as well as home
20 automation and security reflected in the master server. Remote nodes
can act on the Internet database information through a
master/slave/exception protocol supporting automation, metering,
security, electronic cash transfers and Internet URL (Universal Resource
Location) requests.

25 In one embodiment of the invention a master/slave polling message
establishes an event which is used to schedule any waiting exception
message to be transmitted. The system features a master and slave
architecture for initiating reception of secure Internet messages from
30 any node. Each node may be polled systematically, by the server, which
then replicates the data between the related database record and the
slave node. As a result of this arrangement the data transmission
protocol establishes a virtual link to the Internet for remote metering,
information, automation, security, control and electronic commerce in
35 the home or business. In addition the protocol allows messages to be
forwarded to Internet service providers via the server to be able to surf
the Internet via the eLink connection.

The invention allows, for example, the energy consumption from a mains electrical power supply to be measured at the remote node and a deduction of appropriate payments for subscribers according to authorised preprogrammed rates. A virtual Internet link allows for bi-directional secure electronic payments so that the attached smartcard and e-cash devices can debit or credit approved payments. The automatic remote metering and control protocol is defined for communication between remote nodes and an on-line database web server (eg. Utility Gateway) which may communicate through data collection units supporting protocol conversion. A World Wide Web browser can monitor and control devices in homes and businesses via the utility server and slave nodes using the virtual link enabled by this described method and protocol.

1 5 Combined Transfer Media Functionality

In a further embodiment of this invention there is proposed a method for operating a remote control and monitoring system that replicates data between a host computer located at a central server site and a set of automation nodes located at a remote site. The replicating protocol provides a virtual link between the said remote site to said central website, and includes;

- means to monitor said data such as utility meter readings, security, finance and Internet requests; and
- means to link the data collected for subsequent access via the Internet

The system can communicate with a central server over existing wire and wireless communication systems, such as local telephone, cellular phone, radio, powerlines, landline, leased line, dial-up modem links and cable interfaces. The protocol may operate in a half-duplex mode over single transmission pair.

Local Electronic Billing and Payment

A further advantage of the system is that once information is known, the system may provide a gateway to advanced consumer services at the

remote location including prepayment systems. For example the system could be used for an energy billing system for charging the energy usage of a metered device in accordance with a downloaded authorised rate schedule from a webserver. Each predefined rate
5 schedule can define different times periods and amounts of payment deductions directly from an e-cash. The schedule of rates and periods form part of the VIL protocol which also supports the transmission of the metered utility consumption.

10 **Back-Channel Web Browsing**

A further advantage of the invention is that it can act as a service agent for fulfilling requests of a web browser client coupled to a local PC, Digital or Web TV set-top interface. This method of transmission of
15 simplex Internet requests, mainly URL addresses is unique through exception messaging in combination with master/slave polling of automation and/or metering information to the server. The one way simplex operation provides a back-channel capability for utility providers to deliver interactive services for their subscribers. Security,
20 local government and on-line information providers are regarded as utilities in addition to the traditional providers of water, gas, electricity and telephone services. Under this scheme each home has a equivalent IP address on the system and the remote node can send a request within the protocol.

25 With this back-channel capability URL's are sent from the home to broadcast Internet providers supporting web browsing from TV cable and satellite downfeeds. A feature of the protocol is the reversal of the high integrity polled data which has low priority in response time
30 combined with the low integrity Internet requests which gets the highest priority for speed of transmission. In this way the protocol can connect homes to the Internet through URL requests from set top boxes to their broadcast TV service provider. The utility server can act as a half duplex server that is specifically designed to pass Internet requests to
35 broadcast systems. With very little additional overhead to automated metering a utility provider can forward subscriber Internet data requests to a broadcast service provider who can transmit Internet data to a browser running on a PC or TV with an Internet address.

Internet Control

5 The invention also provides a method of controlling devices attached to remote nodes provided through the Internet by the virtual linking of data records in the master web server. Under this arrangement each remote node has a virtual Internet address which is replicated from the server database. The web server can have the capability to be changed by authorised users through the Internet using a range of available
10 commercial technologies. The database fields in the records (including security and air-conditioning controls) are dynamically linked to the remote nodes (automation interface node) by the VIL Protocol using a master/slave polling method with error checking to ensure integrity. This enables residents and other subscribers to turn on a range of connected
15 devices in the home or work premises using the Internet.

Replication through sub-networks

20 Data concentrators may be of a type that use the same communication protocols as the remote nodes. This provides a means to route messages to a destination node through a second network and still maintain the virtual link between the server and the remote node. Data Concentrators are routers used to speed up communications in systems with many slaves. Each Data Concentrator replicates communication to
25 a group of slaves through one communication port and acts as a large slave through the second port. The software then replicates the second port as if it were a large slave with increased speed.

30 The Data Concentrator or Replicator can act as a Protocol Converter and communicate with the server using a higher speed communication channel using a variety of protocols yet maintaining the overall virtual Internet Link protocol between master server and slave node. The Data Concentrators can communicate with the slave devices using dial-up telephone, leased line, microwave, radio or satellite interfaces.
35 Additional wide area or local area network interfaces can be used. A store and forward feature allows any Data Concentrator to relay a message to another when direct re-transmission is not possible. The

data concentrator can be used to pass on or relay the message in both directions.

Exception Messaging

5

In another embodiment the present invention provides for a method to support exception message transmission from the slave node when a request is initiated. When such a request is detected the slave unit initiates a transmission to the Master unit and transfers that data. Timing is used to avoid potential collisions using the slave address to do this.

10

Before any unit transmits it must first detect if any other unit is transmitting. This is achieved by detecting the break in the polled transmission and if another exception transmission is detected it delays until the end of the next polled transmission before it tries again. When multiple slaves require transmission at the same time an avalanche effect can result causing erratic system operation and sometime system failure.

15

To cope with this a fall back process is used so that if after all possible attempts send the message caused by the exceptions have failed, each slave stops trying to transmit and waits until polled by the master.

20

The present invention thus relates to a method for a virtual link, hereinafter referred to as eLink interconnecting online database records to automation apparatus using a different type of message protocol with embedded URL's referenced to international standard addresses for home and business devices. The new protocol allows for utility load shedding over the Internet where the utilities may include water, gas, electricity, telecommunications, security and the Internet.

25

30

In a preferred embodiment there is provided a method for a virtual link interconnecting online database records to automation apparatus using a different type of message protocol with embedded URL's referenced to international standard addresses for home and business devices. eLink protocol allows for utility load shedding over the Internet. Utilities include water, gas, electricity, telecommunications, security and Internet. eLink establishes a virtual link to the Internet for metering, information, automation, security, control and electronic commerce in the home or business. In addition Internet request

35

messages can be forwarded to Internet service providers via eLink. eLink collects data from the special purpose eHub automation interface in the home. This is based on embedded internet protocols IP associated with each microprocessor automation interface (eHub).

5

At the other end, eLink is able to connect with a secure Web Server database. The database uses IP extended addressing to map each device in the home into internet address space and is used to collect utility data from remote meters.

- 10 Each home owner is represented by encrypted records in the data base, and access to relevant fields is available to each participating utility. This is illustrated in Figure 1 where the desired home appliances or utilities are mirrored on an external server. eLink provides each home owner with access to their specific meter reading data that has been collected in the data base. eLink can also
- 15 provide each utility with access to its specific data in the data base. eLink thus provides the basis for both home owners and utilities to share and monitor utility resource usage.

- Home owners can also perform other home based transactions and access the
- 20 Internet using eLink. Transactions may be initiated from the home or any other location with an Internet connection. In particular, the home owner can initiate requests for data to be sent via cable or satellite to the TV in the home.

- It may be noted that in the home, eHub works with all a range of home
- 25 management and remote devices including C-Bus, X10, CE-Bus, I-wire and other protocols which may be multiplexed through eHome wiring network in the home. eLink assists utilities to develop systems for automatic meter reading and load shedding leading using the internet leading to prompt payment or prepayment systems based on ecommerce from the webserver databases.

30

eLink is a virtual link replicating online database records to the eHub automation interface in the home. eLink is used for remote information reading as well as home automation and security replicated in the webserver. The media independent eLink network connection with the home, exchanges URL

35 information supporting automation, metering, security, ecommerce transfers and Internet backchannel requests.

eLink is designed to work with a range of home management systems and

devices. eLink will support with industry standards such as CEBus and Universal Plug and Play through cross matching standard addresses into the eLink URL message structure.

- 5 The automatic remote metering and control protocol provides communication between the eHub and an online database web server (eg. Utility Gateway). This enables the home owner to monitor and control devices in home via a web browser either in the home or remotely through the Internet, examples of this shown in Figure 5 where a home owner may access any one of a number of
- 10 control panels such as appliance, security, environment or utilities. Once a particular panel is chosen, such as the environment in Figure 6 and security in Figure 7 the home owner can change control different systems. Thus, the home owner can turn the air conditioner on, and next time that the server updates the eHub the actual command is executed in the home.

- 15 In the future this allows each home to have a equivalent IP address without a PC in the home as it resides on the Utility Gateway server. The remote eHub node can send a request within the protocol. With this backchannel capability, URL's can be sent from the home to broadcast Internet providers
- 20 supporting web browsing from TV via cable and satellite broadcast services. This feature can connect homes to the Internet through URL requests from eHome's to their broadcast TV service provider. The utility server can act as a half duplex server that is specifically designed to pass Internet requests to these broadcast providers. By using very little additional overhead to
- 25 automated metering, a utility provider can forward subscriber Internet data requests to a broadcast service provider who can transmit Internet data to a browser running on a PC or TV with an Internet address.

- Remote control is provided through the Internet by the linking of data records in the gateway Web Server. Under this arrangement each remote node has a
- 30 virtual Internet address which is replicated from the server database. The home record in the server has the capability to be changed by authorised users though the Internet using security (eg name & password or digital signature). The database fields in the records (including security and air-conditioning controls)
- 35 are dynamically linked to the automation interface to enable residents and valid subscribers to turn on a range of connected devices in the home using the Internet.

The eHub control panel, designed for the home, will provide a convergent point of access to phone, water, gas, electricity, Internet and security services.

- 5 The eHome system may handle totalising counts from electricity, water and gas meters with pulsed or digital outputs including protection against tampering with the inputs. Interface to existing home automation systems is achieved through digital I/O and serial ports which allow for optional connection to a PC including providing a shared modem facility in the home.
- 10 The master/slave polling message establishes an event which is used to schedule any waiting exception message to be transmitted after a programmable time delay. The eLink system features a master and slave architecture for initiating reception of secure Internet requests messages from any node. Each node may be polled systematically, on a virtually continuous or periodic basis,
- 15 by the server, which then replicates the data between the related database record and the addressed slave node. As a result of this arrangement the data transmission protocol establishes a virtual link to the Internet for remote metering, information, automation, security, control and electronic commerce in the home or business. In addition the protocol allows messages to be forwarded to Internet
- 20 service providers via the server to be able to surf the internet via the eLink connection.
- The energy consumption measured at the remote node may deduct e-cash payments for subscribers according to authorised pre-programmed rates. The
- 25 virtual Internet link allows for bi-directional secure electronic payments so that the attached smartcard and e-cash devices can remove debit or provide credit approved payments. The automatic remote metering and control protocol is defined for communication between remote nodes (eg. eHub) and an online database web server (eg. Utility Gateway) which communicate through data
- 30 collection units supporting protocol conversion. A World Wide Web browser can monitor and control devices in homes and businesses via the utility server and slave nodes using the virtual link enabled by the this defined described method and protocol.
- 35 A Utility Gateway Server, includes a computer which is connected to the Internet and the remote nodes through a data concentrator multiplexer unit for generation of commands and the receipt of data over communication lines. The commands generated by the server contain an address portion and a command message

portion.

There is an eHub automation interface node located at each customer residence. Each automation interface node is capable of selectively communicating with a plurality of utility meters and attached devices, for selectively driving a plurality of devices at a customer residence, for monitoring the status of a plurality of external contacts, and for selectively providing a plurality of alarms and messages to the customer. Each node includes a receiver for receiving commands from the server over a plurality of communication lines as well as a transmitter for transmitting return messages to the server over the same communication line. In order to increase the through-put capability, the protocol allows priority to requests for Internet addresses over commands for meter reading and security transfers.

The present invention thus provides a remote automatic meter reading, control and security system as a background activity. It may further provide an automatic utility payment system, with encrypted security, for payment of the measured reading of a consumed commodity using a range of electronic commerce methods accepted by the consumer and the utility. Yet further it may provide a remote automatic meter reading, control and customer alert system incorporating controls for improving the energy management of utility services by customer usage and exception reporting, as well as assuring that loads which have been authorised to be turned off by the system will once again be turned on.

Still further still the invention may provide a master/slave command and message interlaced with customer event requests whereby the data throughput for Internet requests is enhanced. Yet further still the present invention may provide a meter reading, control and security system incorporating polled message formats in order to provide high integrity of customer billing information, security system operation and electronic funds transfer to the server database.

eLink is a unique IP based protocol for home automation using powerlines, telephone wire and radiowireless media. Under this scheme each home has an IP address on a server database with utility fields (including security and air-conditioning controls) dynamically linked to the home embedded controller (eHub automation interface node) using a master/slave polling with Internet IP embedded protocol. IP addresses can be sent from the home for supporting Internet web browsing.

This eLink protocol would run on a range of hardware including the eHub in the home where it can connect to lighting, environment and entertainment networks. e-cash can be transferred in both directions and the protocol is suitable for industrial telemetry applications.

The Home Management System includes utility billing and control via the Internet. Each home has a equivalent TCP/IP address like a street address and crossed referenced to the telephone number. The protocol includes security and authorised access to standards accepted for electronic commerce. The eLink protocol is an efficient communications scheme to provide a virtual link to connect a record in the server database to a number of services in the home.

Embedded controller technology in the automation interface provides an in-home local-area network (LAN) that can control home appliances and services that implement multiple protocols in addition to the virtual link to the Utility gateway server. Each household can use a set-top box or PC as a terminal for interfacing the automation interface with major home appliances and consumers. eLink allows telemetry to function over radio, powerlines landline, leased line, dial-up modem links and cable interfaces such as RS232, RS422, RS485. Via external converters it is also possible to link units via fibre optic.

eLink can be used for SCADA (Supervisory control and data acquisition) systems where SCADA refers to the combination of the fields of telemetry and data acquisition encompassing the collection of the information, transferring it back to a central site, carrying out any necessary analysis and control and then displaying this data on a number of operator screens.

The server as master makes regular, repeated requests for data to each slave (eHub) in sequence, writing the data to each unit and reading that unit's data back in response. This is a half duplex protocol where the slave only responds to a request from the master. Each slave unit has a unique address or identification number based on IP sub-addressees to allow this to function correctly. If the slave does not respond within a defined time, the master will retry again (up to a configurable number of retries) and then carries on polling the other units in the system. It is possible to retry that unit again on several more re-transmissions before marking it as failed link after which the master will only poll it once each poll period to enable a restored link to be detected.

To overcome some of the following disadvantages in polled systems eLink can use sub-master networks so that there are several small, fast messages which can be received by the server master in between polled messages.

- 5 • Normally the interrupt type requests from a slave requesting urgent action cannot be handled within master/slave protocols.
- Systems which are lightly loaded with minimum data changes from a slave are quite inefficient and unnecessarily slow

10 eLink supports Report By Exception as the slave station monitors its own inputs for a request for Internet data. When such a request is detected the slave unit initiates a transmission to the Master unit and transfers that data. Timing is used to avoid potential collisions using the slave IP sub address to do this. Before any unit transmits it must first detect if any other unit is transmitting. This can be done
15 by detecting the break in the polled transmission and another exception transmission is detected transmission a delay is required until the end of the next polled transmission before it tries again. When multiple slaves require transmission at the same time an avalanche effect can result causing erratic system operation and sometime system failure. To cope with this a fall back
20 process is used so that if after all possible attempts send the message caused by the exceptions have failed, each slave stops trying to transmit and waits until polled by the master.

The advantages of this are:

- 25 • It reduces the unnecessary transfer of data at any particular time as in polled systems.
- URL requests are detected quickly.

Internet addresses are assigned to slave nodes on the Internet server which is the master for the network. Each host gateway server must have its own Internet
30 address and support sub-addresses for each slave node. A database is normally used for Address Resolution and storage of information exchanged with each slave. It should also translate Internet addresses to Ethernet addresses when needed with LANS and WANS.

35 eLink protocol runs over a variety of network media: IEEE 802.3 (ethernet) and 802.5 (token ring) LAN's, X.25 lines, satellite links, and serial lines. There are standard encapsulations for eLink packets defined for many of these networks. Serial Line eLink, is used for master/slave serial connections using wire and

wireless media.

eLink defines a sequence of characters that frame data packets on a serial line. It provides addressing, packet type identification, error detection/correction and compression mechanisms.

eLink is used for automation applications. It supports URL requests to connect homes to the Internet through a secure webserver. The utility server can act as a half duplex server that is specifically designed to pass Internet requests to broadcast systems. With very little additional overhead an utility server can forward customer data requests to a broadcast service provider who can transmit Internet data to a browser running on a PC or TV with an Internet address.

1.5 eHome Cabling example

Peripheral monitoring devices such as movement detectors have traditionally been connected to a host by means of four core cable. The advent of low cost cameras and the image handling capability of eHome means that video surveillance will increasingly be used. eHome uses eight core Category 5 cable via-RJ45 plugs and sockets to connect peripheral devices to eHub remote nodes.

To allow manufacturers of peripheral devices to ensure their products are compatible with eHome and directly connectible to eHub nodes the following wiring pinout is defined using any colours in the designated order by the following table:

Wire colour	Function	Cat5 pin
White/green	Video / AC	1
Green	Video /AC	2
White/orange	+12V	3
Blue	+5V	4
White/blue	eLink	5
Orange	Ground	6
White/brown	Signal / eLink Back Channel	7
Brown	Tamper / eLink Back Channel	8

Embedded URL Address

- 5 eLink uses an embedded IP protocol with 128-bit addressing, allowing for an expanded addressing scheme involving sub-addressing. eLink uses the 128-bit address as follows:

	No of bytes	Description
10	0-3	Standard IP Address
	4-7	Customer ID, 10-digit phone number in binary, for example
	8-11	Bit – cross-referenced to tables for Contact ID, CEBus Number, X10 Address, Status, enabling and command
15	12-15	Operator – set as a value, giving and on/off status and values eg temperature readings, and meter readings.

The 128-bit address structure of eHome comprises a main address and three sub-addresses. Each address has specific significance to a Web browser:

- 20 A virtual link is created from the database to the device. eLink devices could be any or all of the following:
- Security Camera
 - Air conditioner, heating unit, lights, and other connected devices
 - Utility Meters for Electricity, Gas, Water and Recycled Water
- 25 • Energy Management Control

The database itself is stored on a secure web server, and accessed through a website. The application (1) running continuously scans the database, checking for any updates, modifications, new or deleted entries, etc.

- 30 When a client wished to access their home though the website, a message (2) is sent from the application to the modem connected to the web server. The message can be in the form of:
- A Secure eLink Message via E-mail
- 35 • A Dial-up Connection via modem using TCP/IP
- Direct Internet Connection using TCP/IP (ie. not through E-mail)
 - Or Another Form such as radio and powerlines

Each house that has eHome installed uses a modem, which is connected through the Security System. The message is received by this modem, which sends it over the CEBus, or other transmission media to devices connected to the eHub.

If eHub is also connected to a computer, this receives the message and initiates corresponding actions to devices in the home. The message contains information to perform functions or gather information for these devices in the home. These include:

- Security Camera Pictures
- Turning on/off devices
- Reading Utility Meters
- Energy Control reading and change of mode setting

Internet protocol V6

The present invention is particularly useful when the new Internet Protocol, Version 6 (IPv6) will become the standard. IPv6 is designed to be a simple, forward-compatible upgrade to the existing version of IP. This upgrade is also intended to resolve all of the weaknesses that IPv4 is currently manifesting, including the shortage of available IP addresses, the inability to accommodate time-sensitive traffic, and its lack of network layer security.

The next generation of IP, commonly known as IPng but more correctly identified as IPv6, offers a vastly expanded addressing scheme to support the continued expansion of the Internet, and an improved ability to aggregate routes on a large scale.

IPv6 also supports numerous other features, such as real-time audio or video transmissions, host mobility, end-to-end security through network layer encryption and authentication, as well as auto-configuration and auto-reconfiguration. It is expected that these services will provide ample incentive for migration as soon as IPv6-capable products become available. Many of these features still require additional standardization. Therefore, it would be premature

to expound upon them at any great length.

The one aspect of IPv6 that can, and should, be expounded upon is its addressing. IPv4's 32-bit address length gave the protocol a theoretical capability to address 2 to the 32nd power, or about 4 billion devices. Inefficient subnet masking techniques, among other wasteful practices, has squandered this resource.

IPv6 uses a 128-bit address and is theoretically capable of 2 to the 96th power times the size of the IPv4 address space. This equals 340,282,366,920,938,463,463,374,607,431,768,211,456 mathematically possible addresses. Only about 15 percent of this potential address space is currently allocated. The remainder is reserved for future use and includes the capacity for eLink messages by direct IP mapping of devices in the home.

CLAIMS

1. A system for the remote control of at least one electrical apparatus said
5 system including:
a first control means adapted to communicate with said apparatus;
a second control means adapted to communicate with said first
control means;
said second control means including a dynamic memory storing
10 information about the status of said electrical apparatus and including
an input means enabling said status to be altered, wherein when said
status has been altered the second control means communicates said
new status to said first control means which subsequently checks the
15 status of said apparatus and alters it if necessary to be the same as the
new communicated status.
2. A system for the remote access of at least one utility meter said system
including:
a first control means adapted to communicate with said meter;
a second control means adapted to communicate with said first
20 control means;
said second control means including a dynamic memory storing
information about the status of said meter wherein said status is
updated by the first control means communicating said new status to
said second control means.
- 2.5 3. A system as in either claim 1 or claim 2 wherein said information is
security protected from access by unauthorised persons.
4. A system as in claim 2 wherein said meter information is further
accessible by the appropriate utility authority through said second
control means.
- 3.0 5. A system as in claim 4 wherein said utility authority can control said
utility meter.
6. A system as in any one of the above claims wherein said second control
means communicates to said first control means via the Internet.

7. A system as in either claim 1 or claim 2 wherein said second control means communicates with said first control means via an electrical power distribution means.
- 5 8. A system as in any one of the above claims wherein said second control means receives regular status updates from said first controller.
9. A system as in claim 5 wherein said updates occur at regular pre-determined temporal intervals.
10. A system as in claim 5 wherein said updates occur continuously.
- 10 11. A system as in any one of the above claims wherein said status includes information such as control information, management information and service information of said apparatus.
12. A system as in claim 1 wherein said first control means is a microprocessor.
- 15 13. A system as in any one of the above claims wherein said second control means is a computer server.
14. A system as in claim 10 wherein said information is a home page on said server.
15. A management apparatus for electrical apparatus including:
20 a sensor on said apparatus communicating information about said apparatus to a microprocessor;
said microprocessor adapted to communicate with a server, said server accessible through the Internet and having a homepage which changes based on received and analysed operation of said apparatus and which enables control of said apparatus.
- 25 16. A household electrical appliance controller including;
a controller associated with each said appliance providing status and control information of each electrical appliance;
said controller adapted to communicate with a server accessible
30 through the Internet, said server including a homepage displaying said status information and enabling control of said electrical appliance through said controller.

17. A method of monitoring and controlling a plurality of apparatus through the Internet including:

- controlling and monitoring said apparatus by a microprocessor,
- accessing said microprocessor through a communication network
- 5 from a server accessible on the Internet;
- providing said server with a homepage with updated information from said microprocessor; and
- changing said homepage which results in said server
- communicating said change to said microprocessor which in turn
- 10 changes said status of said apparatus.

1/7

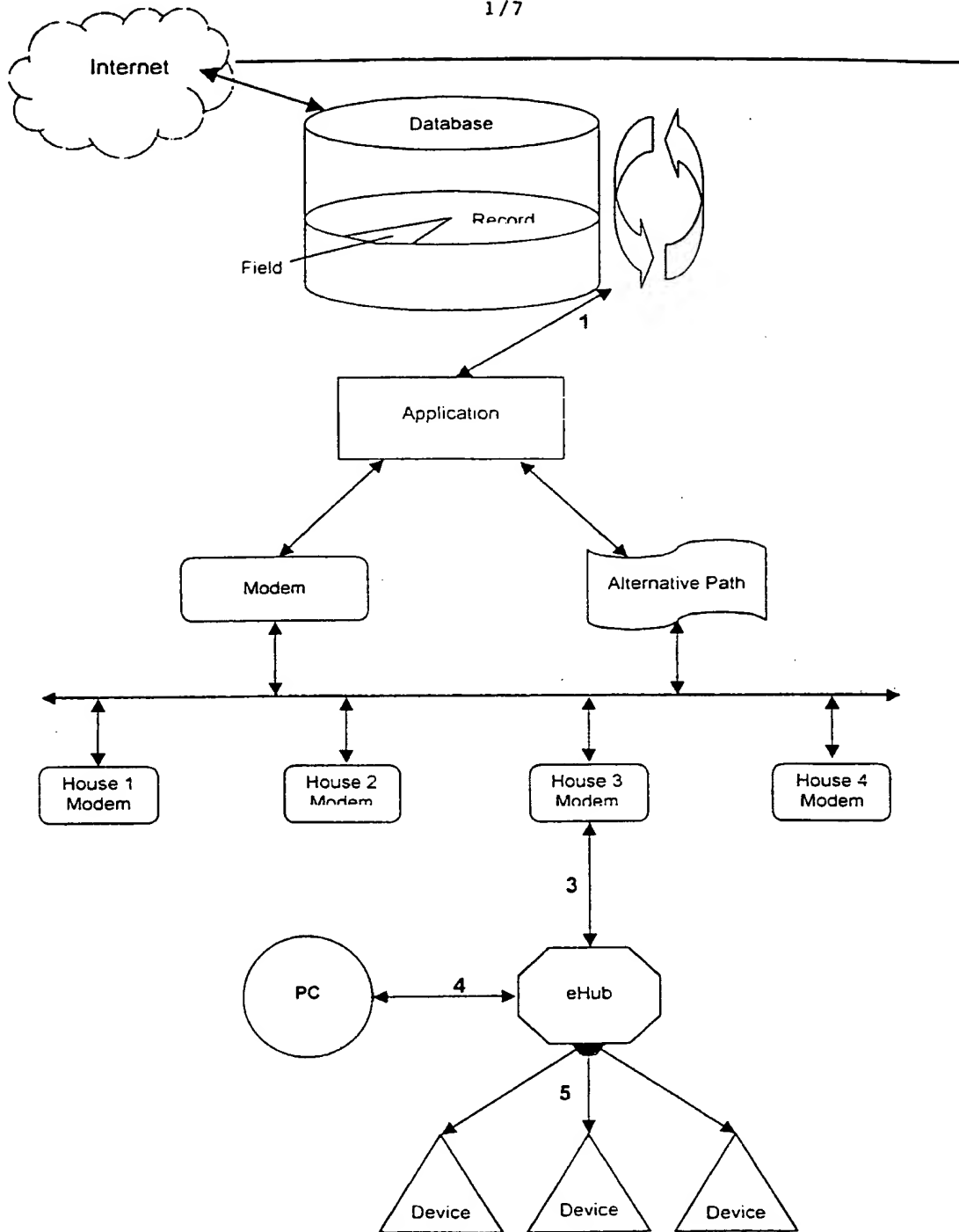
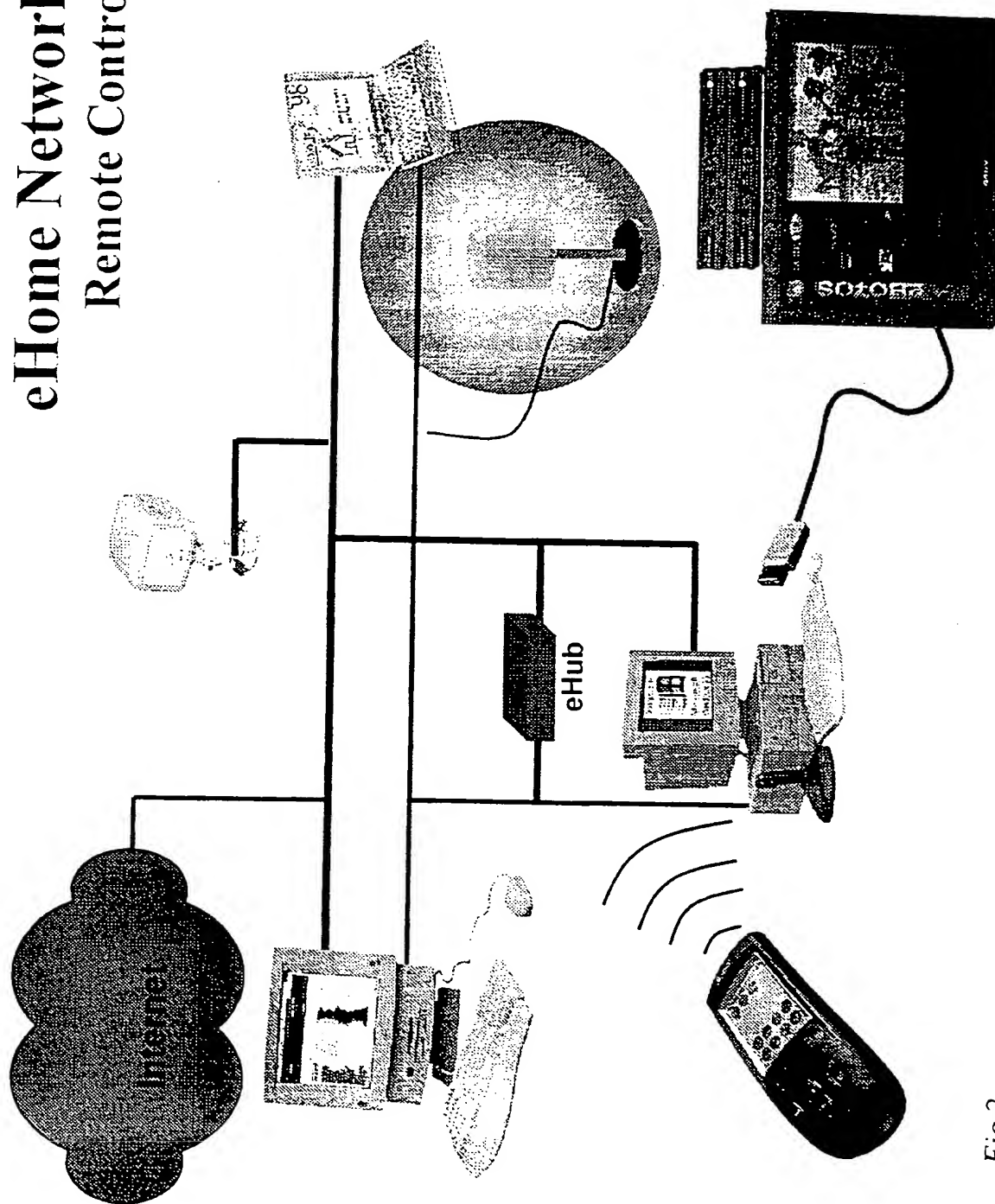


Fig 1

eHome Network Remote Control

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Fig 2

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Security and the Internet

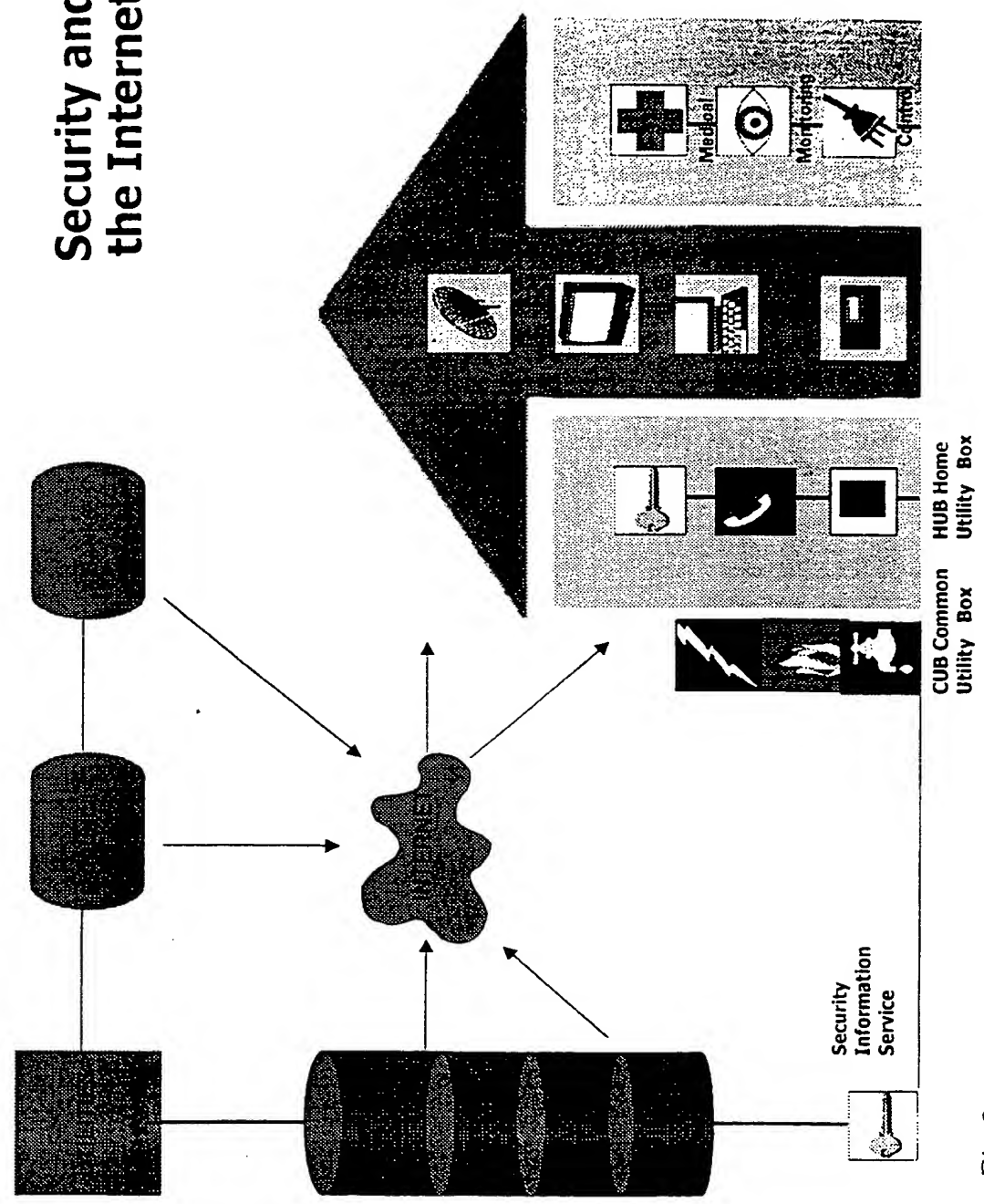


Fig 3

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Secure Online Server

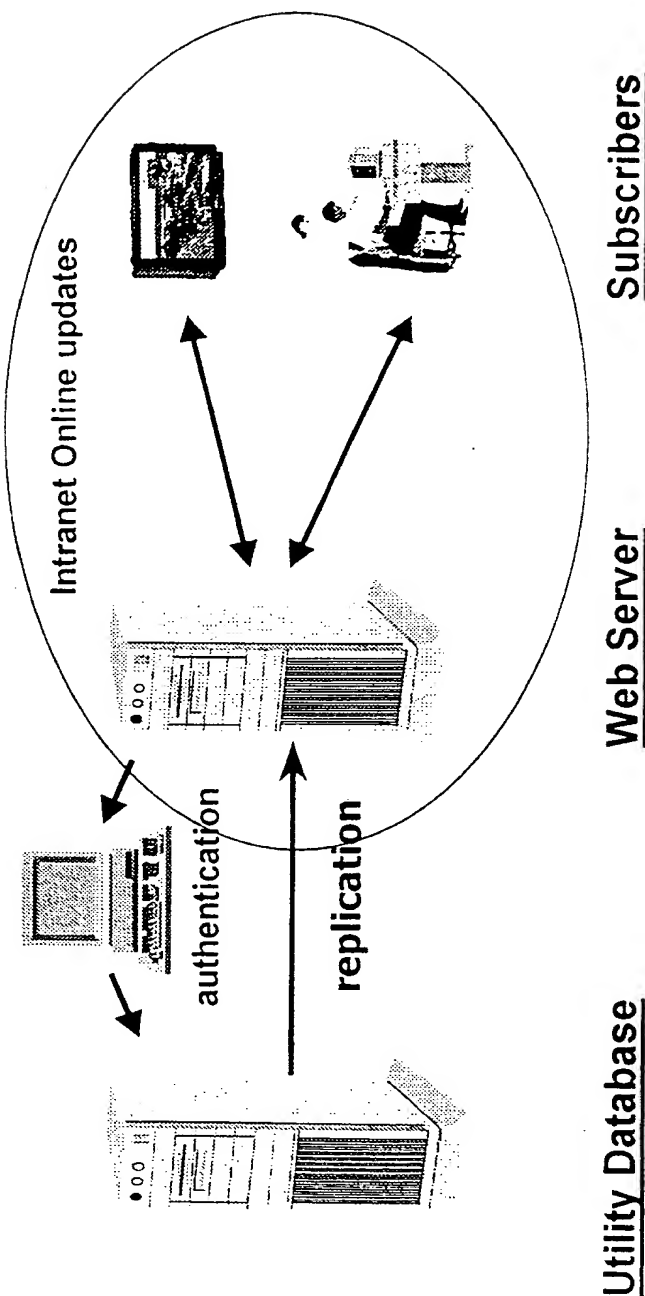


Fig 4

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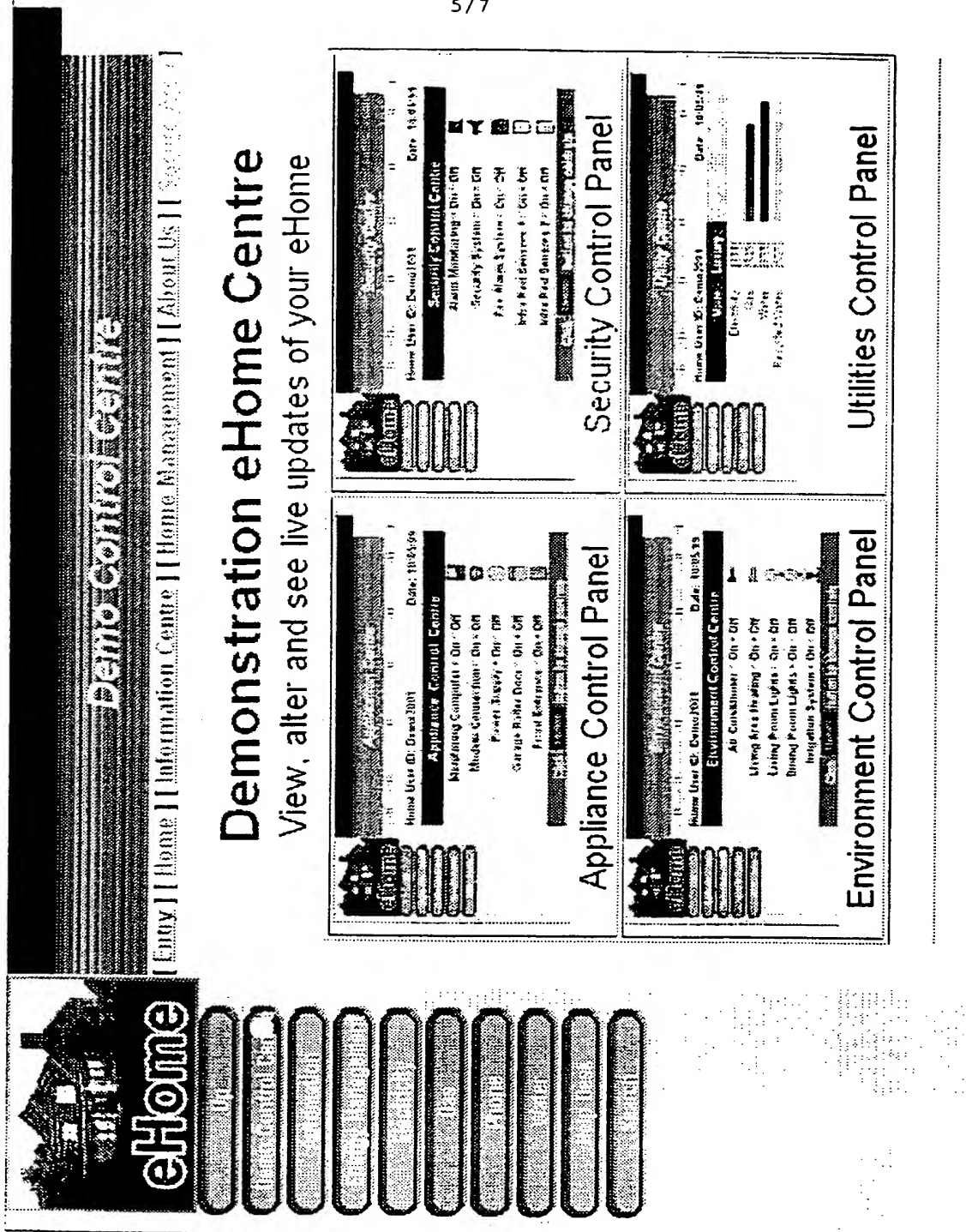


Fig 5

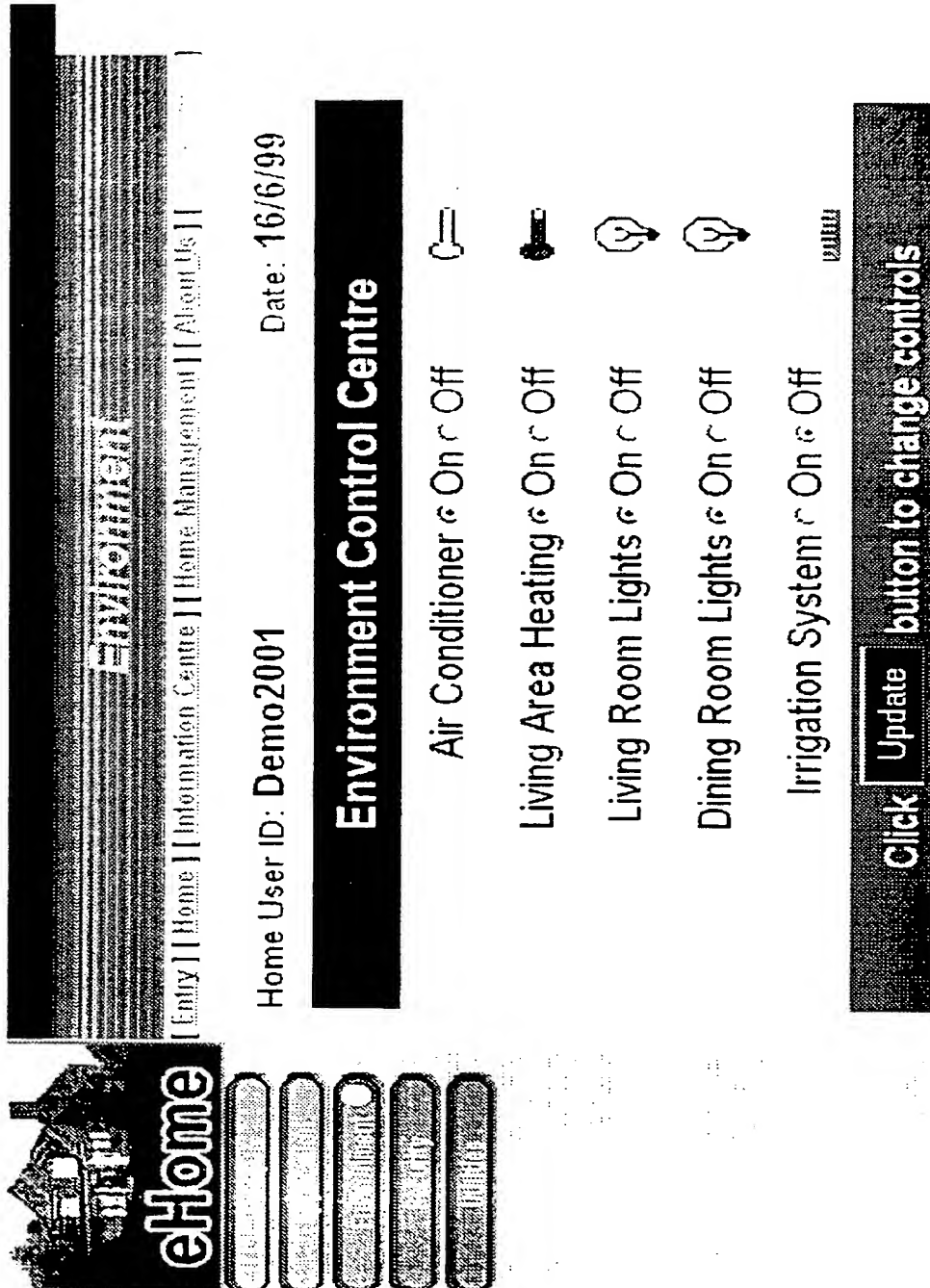
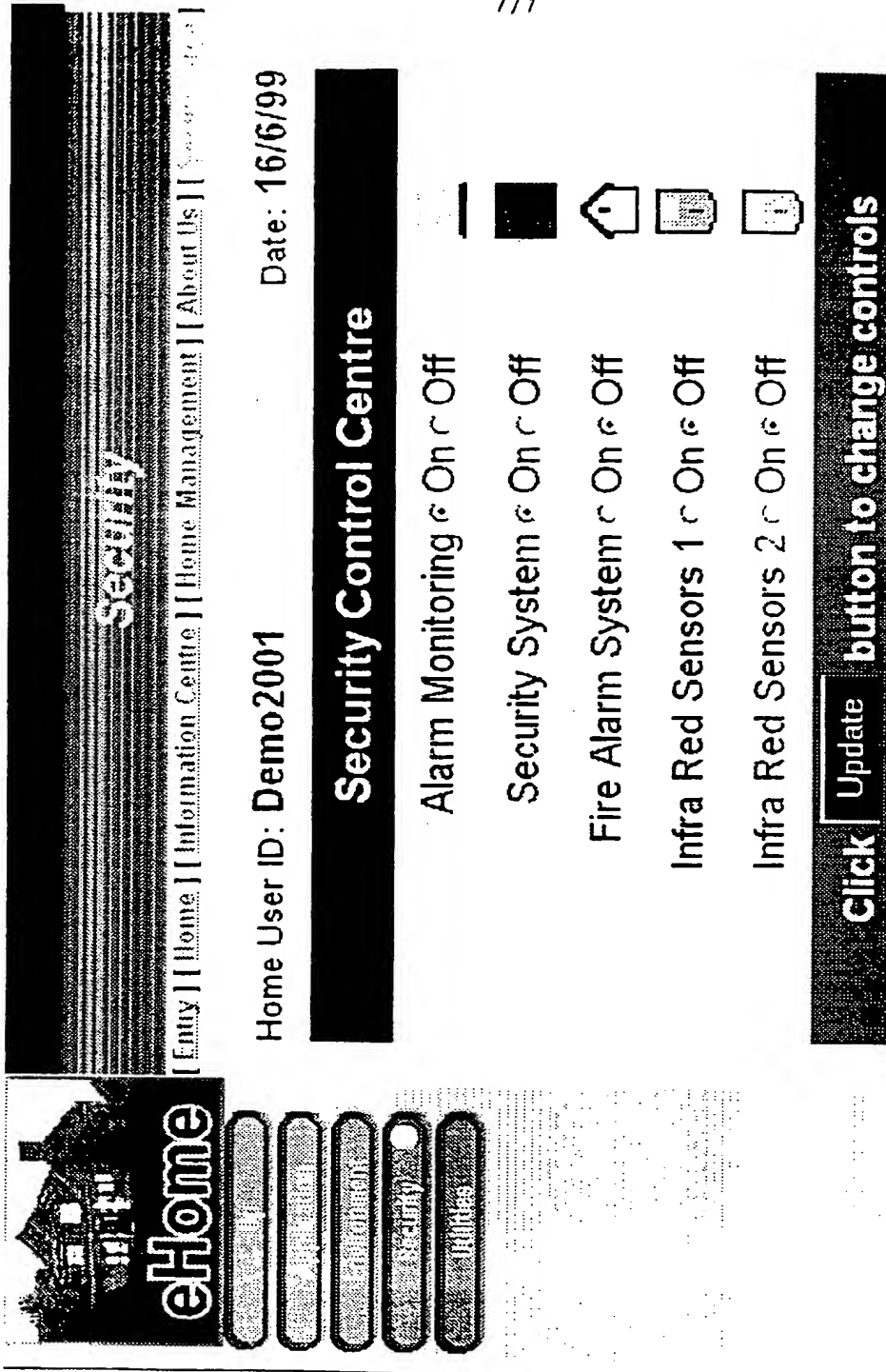


Fig 6

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Fig 7

Internet utility interconnect method and means

FIELD OF THE INVENTION

5

The present invention relates to a method and an apparatus employing said method providing a virtual link interconnecting on-line database records to automation apparatus.

10 BACKGROUND OF THE INVENTION

15

It is well known to control or access a variety of apparatus in a home or a commercial environment through an electronic network, whether that be through existing telecommunication lines; by radio control or through electrical supply lines. One of the more common uses is to access various utilities, such as electrical or gas meters, or security apparatus. To achieve this, it is necessary to have an intelligent controlling means in the home or commercial environment that can be externally accessed to allow for immediate control or access to various apparatus. The difficulty with this is that to ensure one can effectively have access into the home or commercial environment, a dedicated connection into the home or commercial environment is necessary. The infrastructure necessary as well as the expense of a dedicated communication line is prohibitive to most users and utilities.

25

It is an object of the present invention to overcome at least some of the abovementioned problems or to provide the public with a useful alternative. This is achieved by providing a method and apparatus for a virtual link interconnecting on-line database records to automation apparatus and that is adapted to use different types of message protocols.

30

SUMMARY OF THE INVENTION

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Therefore in one form of the invention there is proposed a system for the remote control of at least one electrical apparatus said system including:
a first control means adapted to communicate with said apparatus;
a second control means adapted to communicate with said first

control means;

5 said second control means including a dynamic memory storing information about the status of said electrical apparatus and including an input means enabling said status to be altered, wherein when said status has been altered the second control means communicates said new status to said first control means which subsequently checks the status of said apparatus and alters it if necessary to be the same as the new communicated status.

10 In a further form of the invention there is proposed a system for the remote access of at least one utility meter said system including:

 a first control means adapted to communicate with said meter;

 a second control means adapted to communicate with said first control means;

15 said second control means including a dynamic memory storing information about the status of said meter wherein said status is updated by the first control means communicating said new status to said second control means.

20 Preferably said information is security protected from access by unauthorised persons. This can be achieved by well known password and computer software protection techniques.

25 Preferably said meter information is further accessible by the appropriate utility authority through said second control means. Thus, for example, the gas company may be able to access information about the use of gas at a property and can use that data for charging the customer. In addition, control of the meter may allow the gas company to shut down the flow of gas as may be necessary in an emergency or during period of high demand. There could however be a proviso for a user to override the utility companies control.

30 Preferably said second control means communicates to said first control means via the Internet. Since the Internet is already a well established network with known protocols and security and is accessible from almost anywhere in the world this allows a user to control their own appliances in the home from virtually anywhere whilst providing appropriate security.

35 Alternatively the second control means communicates with said first control means via an electrical power distribution means. In addition, the communication may be through any means such as cellular phone, radio

network and the like.

Preferably said second control means receives regular status updates from said first controller. These updates preferably occur at regular pre-determined temporal intervals. For example, the system could be updated every 30 minutes. The update time could also change according to the time of day and the like. Thus, at night, the system may need to update only every couple of hours whereas during the day it may occur at intervals of even a few minutes.

Preferably said updates occur continuously.

10 In preference said status includes information such as control information, management information and service information of said apparatus. This then allows the user to know all of the information that is available.

In preference first control means is a microprocessor. This means that a home user does not need to provide for a computer to control their appliance. It can be a simple electronic microprocessor which obviously reduces the cost significantly and avoids the necessity to provide not only support for the home computer but continual upgrades.

In preference second control means is a computer server. This a single server could provide use for thousands of home users. Preferably said information is a home page on said server which is easily accessible through the Internet.

In a yet further form of the invention there is proposed a management apparatus for electrical apparatus including:

25 a sensor on said apparatus communicating information about said apparatus to a microprocessor;

said microprocessor adapted to communicate with a server, said server accessible through communication including the Internet and having a database which changes based on received and analysed operation of said apparatus and which enables control of said apparatus.

30 In a still further form of the invention there is proposed a household electrical appliance controller including;

a controller associated with each said appliance providing status and control information of each electrical appliance;

said controller adapted to communicate with a server accessible through the Internet, said server including a homepage displaying said status information and enabling control of said electrical appliance through said controller.

- 5 A In a still further from of the invention there is proposed a method of monitoring and controlling a plurality of apparatus through the Internet including:

- controlling and monitoring said apparatus by a microprocessor,
- accessing said microprocessor through a communication network
- 10 from a server accessible on the Internet;
- providing said server with a homepage with updated information from said microprocessor; and
- changing said homepage which results in said server
- communicating said change to said microprocessor which in turn changes
- 15 said status of said apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

- 20 To assist in understanding the invention reference is made to the following figures in which;

Figure 1 is a flow chart of the method of the present invention;

- 25 Figure 2 is a schematic diagram of a network employing the invention;

Figure 3 is a schematic diagram of the invention in conjunction with security arrangements;

- 30 Figure 4 is a schematic diagram showing the broad concept of the invention when used by utilities;

Figure 5 is a typical on-screen display that may be used by a home owner;

- 35 Figure 6 is a typical on-screen display in relation to an environment control centre; and

Figure 7 is a typical on-screen display in relation to a security control centre.

BEST MODES OF CARRYING OUT THE INVENTION

To further assist in understanding the invention reference is made to the
5 following descriptions which should be read in conjunction with the accompanying drawings.

Intranet protocol

1 0 The invention relates to a method and an apparatus employing that method wherein a master webserver is connected to remote slave nodes using an appropriate protocol for control and automation over networks of different media including wire, radio, microwave and powerlines.

1 5 The arrangement that acts like a virtual Internet link (VIL) which therefore responds to requests from the server and remotes to replicate information as though the remote node is connected to the Internet. The virtual link can be used for remote information reading as well as home
2 0 automation and security reflected in the master server. Remote nodes can act on the Internet database information through a master/slave/exception protocol supporting automation, metering, security, electronic cash transfers and Internet URL (Universal Resource Location) requests.

2 5 In one embodiment of the invention a master/slave polling message establishes an event which is used to schedule any waiting exception message to be transmitted. The system features a master and slave architecture for initiating reception of secure Internet messages from
3 0 any node. Each node may be polled systematically, by the server, which then replicates the data between the related database record and the slave node. As a result of this arrangement the data transmission protocol establishes a virtual link to the Internet for remote metering, information, automation, security, control and electronic commerce in
3 5 the home or business. In addition the protocol allows messages to be forwarded to Internet service providers via the server to be able to surf the Internet via the eLink connection.

The invention allows, for example, the energy consumption from a mains electrical power supply to be measured at the remote node and a deduction of appropriate payments for subscribers according to authorised preprogrammed rates. A virtual Internet link allows for bi-directional secure electronic payments so that the attached smartcard and e-cash devices can debit or credit approved payments. The automatic remote metering and control protocol is defined for communication between remote nodes and an on-line database web server (eg. Utility Gateway) which may communicate through data collection units supporting protocol conversion. A World Wide Web browser can monitor and control devices in homes and businesses via the utility server and slave nodes using the virtual link enabled by this described method and protocol.

1.5 Combined Transfer Media Functionality

In a further embodiment of this invention there is proposed a method for operating a remote control and monitoring system that replicates data between a host computer located at a central server site and a set of automation nodes located at a remote site. The replicating protocol provides a virtual link between the said remote site to said central website, and includes;

- means to monitor said data such as utility meter readings, security, finance and Internet requests; and
- means to link the data collected for subsequent access via the Internet

The system can communicate with a central server over existing wire and wireless communication systems, such as local telephone, cellular phone, radio, powerlines, landline, leased line, dial-up modem links and cable interfaces. The protocol may operate in a half-duplex mode over single transmission pair.

Local Electronic Billing and Payment

A further advantage of the system is that once information is known, the system may provide a gateway to advanced consumer services at the

remote location including prepayment systems. For example the system could be used for an energy billing system for charging the energy usage of a metered device in accordance with a downloaded authorised rate schedule from a webserver. Each predefined rate schedule can define different times periods and amounts of payment deductions directly from an e-cash The schedule of rates and periods form part of the VIL protocol which also supports the transmission of the metered utility consumption.

10 Back-Channel Web Browsing

A further advantage of the invention is that it can act as a service agent for fulfilling requests of a web browser client coupled to a local PC, Digital or Web TV set-top interface. This method of transmission of simplex Internet requests, mainly URL addresses is unique through exception messaging in combination with master/slave polling of automation and/or metering information to the server. The one way simplex operation provides a back-channel capability for utility providers to deliver interactive services for their subscribers. Security, local government and on-line information providers are regarded as utilities in addition to the traditional providers of water, gas, electricity and telephone services. Under this scheme each home has a equivalent IP address on the system and the remote node can send a request within the protocol.

With this back-channel capability URL's are sent from the home to broadcast Internet providers supporting web browsing from TV cable and satellite downfeeds. A feature of the protocol is the reversal of the high integrity polled data which has low priority in response time combined with the low integrity Internet requests which gets the highest priority for speed of transmission. In this way the protocol can connect homes to the Internet through URL requests from set top boxes to their broadcast TV service provider. The utility server can act as a half duplex server that is specifically designed to pass Internet requests to broadcast systems. With very little additional overhead to automated metering a utility provider can forward subscriber Internet data requests to a broadcast service provider who can transmit Internet data to a browser running on a PC or TV with an Internet address.

Internet Control

5 The invention also provides a method of controlling devices attached to remote nodes provided through the Internet by the virtual linking of data records in the master web server. Under this arrangement each remote node has a virtual Internet address which is replicated from the server database. The web server can have the capability to be changed by authorised users through the Internet using a range of available
10 commercial technologies. The database fields in the records (including security and air-conditioning controls) are dynamically linked to the remote nodes (automation interface node) by the VIL Protocol using a master/slave polling method with error checking to ensure integrity. This enables residents and other subscribers to turn on a range of connected
15 devices in the home or work premises using the Internet.

Replication through sub-networks

20 Data concentrators may be of a type that use the same communication protocols as the remote nodes. This provides a means to route messages to a destination node through a second network and still maintain the virtual link between the server and the remote node, Data Concentrators are routers used to speed up communications in systems with many slaves. Each Data Concentrator replicates communication to
25 a group of slaves through one communication port and acts as a large slave through the second port. The software then replicates the second port as if it were a large slave with increased speed.

30 The Data Concentrator or Replicator can act as a Protocol Converter and communicate with the server using a higher speed communication channel using a variety of protocols yet maintaining the overall virtual Internet Link protocol between master server and slave node. The Data Concentrators can communicate with the slave devices using dial-up telephone, leased line, microwave, radio or satellite interfaces.
35 Additional wide area or local area network interfaces can be used. A store and forward feature allows any Data Concentrator to relay a message to another when direct re-transmission is not possible. The

data concentrator can be used to pass on or relay the message in both directions.

Exception Messaging

5

In another embodiment the present invention provides for a method to support exception message transmission from the slave node when a request is initiated. When such a request is detected the slave unit initiates a transmission to the Master unit and transfers that data. Timing is used to avoid potential collisions using the slave address to do this.

10

Before any unit transmits it must first detect if any other unit is transmitting. This is achieved by detecting the break in the polled transmission and if another exception transmission is detected it delays until the end of the next polled transmission before it tries again. When

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multiple slaves require transmission at the same time an avalanche effect can result causing erratic system operation and sometime system failure. To cope with this a fall back process is used so that if after all possible attempts send the message caused by the exceptions have failed, each slave stops trying to transmit and waits until polled by the

20

master.

The present invention thus relates to a method for a virtual link, hereinafter referred to as eLink interconnecting online database records to automation apparatus using a different type of message protocol with embedded URL's referenced to international standard addresses for home and business devices. The new protocol allows for utility load shedding over the Internet where the utilities may include water, gas, electricity, telecommunications, security and the Internet.

30

In a preferred embodiment there is provided a method for a virtual link interconnecting online database records to automation apparatus using a different type of message protocol with embedded URL's referenced to international standard addresses for home and business devices. eLink protocol allows for utility load shedding over the Internet. Utilities include water, gas, electricity, telecommunications, security and Internet. eLink establishes a virtual link to the Internet for metering, information, automation, security, control and electronic commerce in the home or business. In addition Internet request

35

messages can be forwarded to Internet service providers via eLink. eLink collects data from the special purpose eHub automation interface in the home. This is based on embedded internet protocols IP associated with each microprocessor automation interface (eHub).

5

At the other end, eLink is able to connect with a secure Web Server database. The database uses IP extended addressing to map each device in the home into internet address space and is used to collect utility data from remote meters.

- 10 Each home owner is represented by encrypted records in the data base, and access to relevant fields is available to each participating utility. This is illustrated in Figure 1 where the desired home appliances or utilities are mirrored on an external server. eLink provides each home owner with access to their specific meter reading data that has been collected in the data base. eLink can also
- 15 provide each utility with access to its specific data in the data base. eLink thus provides the basis for both home owners and utilities to share and monitor utility resource usage.

- Home owners can also perform other home based transactions and access the
- 20 Internet using eLink. Transactions may be initiated from the home or any other location with an Internet connection. In particular, the home owner can initiate requests for data to be sent via cable or satellite to the TV in the home.

- It may be noted that in the home, eHub works with all a range of home
- 25 management and remote devices including C-Bus, X10, CE-Bus, I-wire and other protocols which may be multiplexed through eHome wiring network in the home. eLink assists utilities to develop systems for automatic meter reading and load shedding leading using the internet leading to prompt payment or prepayment systems based on ecommerce from the webserver databases.

30

- eLink is a virtual link replicating online database records to the eHub automation interface in the home. eLink is used for remote information reading as well as home automation and security replicated in the webserver. The media independent eLink network connection with the home, exchanges URL
- 35 information supporting automation, metering, security, ecommerce transfers and Internet backchannel requests.

eLink is designed to work with a range of home management systems and

devices. eLink will support with industry standards such as CEBus and Universal Plug and Play through cross matching standard addresses into the eLink URL message structure.

5 The automatic remote metering and control protocol provides communication between the eHub and an online database web server (eg. Utility Gateway). This enables the home owner to monitor and control devices in home via a web browser either in the home or remotely through the Internet, examples of this shown in Figure 5 where a home owner may access any one of a number of
10 control panels such as appliance, security, environment or utilities. Once a particular panel is chosen, such as the environment in Figure 6 and security in Figure 7 the home owner can change control different systems. Thus, the home owner can turn the air conditioner on, and next time that the server updates the eHub the actual command is executed in the home.

15 In the future this allows each home to have a equivalent IP address without a PC in the home as it resides on the Utility Gateway server. The remote eHub node can send a request within the protocol. With this backchannel capability, URL's can be sent from the home to broadcast Internet providers
20 supporting web browsing from TV via cable and satellite broadcast services. This feature can connect homes to the Internet through URL requests from eHome's to their broadcast TV service provider. The utility server can act as a half duplex server that is specifically designed to pass Internet requests to these broadcast providers. By using very little additional overhead to
25 automated metering, a utility provider can forward subscriber Internet data requests to a broadcast service provider who can transmit Internet data to a browser running on a PC or TV with an Internet address.

Remote control is provided through the Internet by the linking of data records in
30 the gateway Web Server. Under this arrangement each remote node has a virtual Internet address which is replicated from the server database. The home record in the server has the capability to be changed by authorised users though the Internet using security (eg name & password or digital signature). The database fields in the records (including security and air-conditioning controls)
35 are dynamically linked to the automation interface to enable residents and valid subscribers to turn on a range of connected devices in the home using the Internet.

The eHub control panel, designed for the home, will provide a convergent point of access to phone, water, gas, electricity, Internet and security services.

5 The eHome system may handle totalising counts from electricity, water and gas meters with pulsed or digital outputs including protection against tampering with the inputs. Interface to existing home automation systems is achieved through digital I/O and serial ports which allow for optional connection to a PC including providing a shared modem facility in the home.

10 The master/slave polling message establishes an event which is used to schedule any waiting exception message to be transmitted after a programmable time delay. The eLink system features a master and slave architecture for initiating reception of secure Internet requests messages from any node. Each node may be polled systematically, on a virtually continuous or periodic basis,
15 by the server, which then replicates the data between the related database record and the addressed slave node. As a result of this arrangement the data transmission protocol establishes a virtual link to the Internet for remote metering, information, automation, security, control and electronic commerce in the home or business. In addition the protocol allows messages to be forwarded to Internet
20 service providers via the server to be able to surf the internet via the eLink connection.

The energy consumption measured at the remote node may deduct e-cash payments for subscribers according to authorised pre-programmed rates. The
25 virtual Internet link allows for bi-directional secure electronic payments so that the attached smartcard and e-cash devices can remove debit or provide credit approved payments. The automatic remote metering and control protocol is defined for communication between remote nodes (eg. eHub) and a online database web server (eg. Utility Gateway) which communicate through data
30 collection units supporting protocol conversion. A World Wide Web browser can monitor and control devices in homes and businesses via the utility server and slave nodes using the virtual link enabled by the this defined described method and protocol.

35 A Utility Gateway Server, includes a computer which is connected to the Internet and the remote nodes through a data concentrator multiplexer unit for generation of commands and the receipt of data over communication lines. The commands generated by the server contain an address portion and a command message

portion.

- There is an eHub automation interface node located at each customer residence. Each automation interface node is capable of selectively communicating with a plurality of utility meters and attached devices, for selectively driving a plurality of devices at a customer residence, for monitoring the status of a plurality of external contacts, and for selectively providing a plurality of alarms and messages to the customer. Each node includes a receiver for receiving commands from the server over a plurality of communication lines as well as a transmitter for transmitting return messages to the server over the same communication line. In order to increase the through-put capability, the protocol allows priority to requests for Internet addresses over commands for meter reading and security transfers.
- The present invention thus provides a remote automatic meter reading, control and security system as a background activity. It may further provide an automatic utility payment system, with encrypted security, for payment of the measured reading of a consumed commodity using a range of electronic commerce methods accepted by the consumer and the utility. Yet further it may provide a remote automatic meter reading, control and customer alert system incorporating controls for improving the energy management of utility services by customer usage and exception reporting, as well as assuring that loads which have been authorised to be turned off by the system will once again be turned on.
- Still further still the invention may provide a master/slave command and message interlaced with customer event requests whereby the data throughput for Internet requests is enhanced. Yet further still the present invention may provide a meter reading, control and security system incorporating polled message formats in order to provide high integrity of customer billing information, security system operation and electronic funds transfer to the server database.

- eLink is a unique IP based protocol for home automation using powerlines, telephone wire and radiowireless media. Under this scheme each home has an IP address on a server database with utility fields (including security and air-conditioning controls) dynamically linked to the home embedded controller (eHub automation interface node) using a master/slave polling with Internet IP embedded protocol. IP addresses can be sent from the home for supporting Internet web browsing.

This eLink protocol would run on a range of hardware including the eHub in the home where it can connect to lighting, environment and entertainment networks. e-cash can be transferred in both directions and the protocol is suitable for industrial telemetry applications.

The Home Management System includes utility billing and control via the Internet. Each home has a equivalent TCP/IP address like a street address and crossed referenced to the telephone number. The protocol includes security and authorised access to standards accepted for electronic commerce. The eLink protocol is an efficient communications scheme to provide a virtual link to connect a record in the server database to a number of services in the home.

Embedded controller technology in the automation interface provides an in-home local-area network (LAN) that can control home appliances and services that implement multiple protocols in addition to the virtual link to the Utility gateway server. Each household can use a set-top box or PC as a terminal for interfacing the automation interface with major home appliances and consumers. eLink allows telemetry to function over radio, powerlines landline, leased line, dial-up modem links and cable interfaces such as RS232, RS422, RS485. Via external converters it is also possible to link units via fibre optic.

eLink can be used for SCADA (Supervisory control and data acquisition) systems where SCADA refers to the combination of the fields of telemetry and data acquisition encompassing the collection of the information, transferring it back to a central site, carrying out any necessary analysis and control and then displaying this data on a number of operator screens.

The server as master makes regular, repeated requests for data to each slave (eHub) in sequence, writing the data to each unit and reading that unit's data back in response. This is a half duplex protocol where the slave only responds to a request from the master. Each slave unit has a unique address or identification number based on IP sub-addressees to allow this to function correctly. If the slave does not respond within a defined time, the master will retry again (up to a configurable number of retries) and then carries on polling the other units in the system. It is possible to retry that unit again on several more re-transmissions before marking it as failed link after which the master will only poll it once each poll period to enable a restored link to be detected.

To overcome some of the following disadvantages in polled systems eLink can use sub-master networks so that there are several small, fast messages which can be received by the server master in between polled messages.

- 5 • Normally the interrupt type requests from a slave requesting urgent action cannot be handled within master/slave protocols.
- Systems which are lightly loaded with minimum data changes from a slave are quite inefficient and unnecessarily slow

10 eLink supports Report By Exception as the slave station monitors its own inputs for a request for Internet data. When such a request is detected the slave unit initiates a transmission to the Master unit and transfers that data. Timing is used to avoid potential collisions using the slave IP sub address to do this. Before any unit transmits it must first detect if any other unit is transmitting. This can be done
15 by detecting the break in the polled transmission and another exception transmission is detected transmission a delay is required until the end of the next polled transmission before it tries again. When multiple slaves require transmission at the same time an avalanche effect can result causing erratic system operation and sometime system failure. To cope with this a fall back
20 process is used so that if after all possible attempts send the message caused by the exceptions have failed, each slave stops trying to transmit and waits until polled by the master.

The advantages of this are:

- 25 • It reduces the unnecessary transfer of data at any particular time as in polled systems.
- URL requests are detected quickly.

Internet addresses are assigned to slave nodes on the Internet server which is the master for the network. Each host gateway server must have its own Internet
30 address and support sub-addresses for each slave node. A database is normally used for Address Resolution and storage of information exchanged with each slave. It should also translate Internet addresses to Ethernet addresses when needed with LANS and WANS.

35 eLink protocol runs over a variety of network media: IEEE 802.3 (ethernet) and 802.5 (token ring) LAN's, X.25 lines, satellite links, and serial lines. There are standard encapsulations for eLink packets defined for many of these networks. Serial Line eLink, is used for master/slave serial connections using wire and

wireless media.

- 5 eLink defines a sequence of characters that frame data packets on a serial line. It provides addressing, packet type identification, error detection/correction and compression mechanisms.

- 10 eLink is used for automation applications. It supports URL requests to connect homes to the Internet through a secure webserver. The utility server can act as a half duplex server that is specifically designed to pass Internet requests to broadcast systems. With very little additional overhead an utility server can forward customer data requests to a broadcast service provider who can transmit Internet data to a browser running on a PC or TV with an Internet address.

15 eHome Cabling example

- 20 Peripheral monitoring devices such as movement detectors have traditionally been connected to a host by means of four core cable. The advent of low cost cameras and the image handling capability of eHome means that video surveillance will increasingly be used. eHome uses eight core Category 5 cable via RJ45 plugs and sockets to connect peripheral devices to eHub remote nodes.

- 25 To allow manufacturers of peripheral devices to ensure their products are compatible with eHome and directly connectible to eHub nodes the following wiring pinout is defined using any colours in the designated order by the following table:

Wire colour	<i>Function</i>	<i>Cat5 pin</i>
White/green	Video / AC	1
Green	Video /AC	2
White/orange	+12V	3
Blue	+5V	4
White/blue	eLink	5
Orange	Ground	6
White/brown	Signal / eLink Back Channel	7
Brown	Tamper / eLink Back Channel	8

Embedded URL Address

- 5 eLink uses an embedded IP protocol with 128-bit addressing, allowing for an expanded addressing scheme involving sub-addressing. eLink uses the 128-bit address as follows:

	No of bytes	Description
10	0-3	Standard IP Address
	4-7	Customer ID, 10-digit phone number in binary, for example
	8-11	Bit – cross-referenced to tables for Contact ID, CEBus Number, X10 Address, Status, enabling and command
15	12-15	Operator – set as a value, giving and on/off status and values eg temperature readings, and meter readings.

The 128-bit address structure of eHome comprises a main address and three sub-addresses. Each address has specific significance to a Web browser:

- 20 A virtual link is created from the database to the device. eLink devices could be any or all of the following:
- Security Camera
 - Air conditioner, heating unit, lights, and other connected devices
 - Utility Meters for Electricity, Gas, Water and Recycled Water
- 25 • Energy Management Control

The database itself is stored on a secure web server, and accessed through a website. The application (1) running continuously scans the database, checking for any updates, modifications, new or deleted entries, etc.

30

When a client wished to access their home though the website, a message (2) is sent from the application to the modem connected to the web server. The message can be in the form of:

- A Secure eLink Message via E-mail
- 35
- A Dial-up Connection via modem using TCP/IP
 - Direct Internet Connection using TCP/IP (ie. not through E-mail)
 - Or Another Form such as radio and powerlines

Each house that has eHome installed uses a modem, which is connected through the Security System. The message is received by this modem, which sends it over the CEBus, or other transmission media to devices connected to the eHub.

If eHub is also connected to a computer, this receives the message and initiates corresponding actions to devices in the home. The message contains information to perform functions or gather information for these devices in the home. These include:

- Security Camera Pictures
- Turning on/off devices
- Reading Utility Meters
- Energy Control reading and change of mode setting

Internet protocol V6

The present invention is particularly useful when the new Internet Protocol, Version 6 (IPv6) will become the standard. IPv6 is designed to be a simple, forward-compatible upgrade to the existing version of IP. This upgrade is also intended to resolve all of the weaknesses that IPv4 is currently manifesting, including the shortage of available IP addresses, the inability to accommodate time-sensitive traffic, and its lack of network layer security.

The next generation of IP, commonly known as IPng but more correctly identified as IPv6, offers a vastly expanded addressing scheme to support the continued expansion of the Internet, and an improved ability to aggregate routes on a large scale.

IPv6 also supports numerous other features, such as real-time audio or video transmissions, host mobility, end-to-end security through network layer encryption and authentication, as well as auto-configuration and auto-reconfiguration. It is expected that these services will provide ample incentive for migration as soon as IPv6-capable products become available. Many of these features still require additional standardization. Therefore, it would be premature

to expound upon them at any great length.

The one aspect of IPv6 that can, and should, be expounded upon is its addressing. IPv4's 32-bit address length gave the protocol a theoretical capability to address 2 to the 32nd power, or about 4 billion devices. Inefficient
5 subnet masking techniques, among other wasteful practices, has squandered this resource.

IPv6 uses a 128-bit address and is theoretically capable of 2 to the 96th power times the size of the IPv4 address space. This equals
340,282,366,920,938,463,463,374,607,431,768,211,456 mathematically
10 possible addresses. Only about 15 percent of this potential address space is currently allocated. The remainder is reserved for future use and includes the capacity for eLink messages by direct IP mapping of devices in the home.

CLAIMS

- 5 1. A system for the remote control of at least one electrical apparatus said system including:
a first control means adapted to communicate with said apparatus;
a second control means adapted to communicate with said first control means;
said second control means including a dynamic memory storing
10 information about the status of said electrical apparatus and including an input means enabling said status to be altered, wherein when said status has been altered the second control means communicates said new status to said first control means which subsequently checks the
15 status of said apparatus and alters it if necessary to be the same as the new communicated status.
2. A system for the remote access of at least one utility meter said system including:
a first control means adapted to communicate with said meter;
a second control means adapted to communicate with said first
20 control means;
said second control means including a dynamic memory storing information about the status of said meter wherein said status is updated by the first control means communicating said new status to said second control means.
- 25 3. A system as in either claim 1 or claim 2 wherein said information is security protected from access by unauthorised persons.
4. A system as in claim 2 wherein said meter information is further accessible by the appropriate utility authority through said second control means.
- 30 5. A system as in claim 4 wherein said utility authority can control said utility meter.
6. A system as in any one of the above claims wherein said second control means communicates to said first control means via the Internet.

7. A system as in either claim 1 or claim 2 wherein said second control means communicates with said first control means via an electrical power distribution means.
- 5 8. A system as in any one of the above claims wherein said second control means receives regular status updates from said first controller.
9. A system as in claim 5 wherein said updates occur at regular pre-determined temporal intervals.
10. A system as in claim 5 wherein said updates occur continuously.
- 10 11. A system as in any one of the above claims wherein said status includes information such as control information, management information and service information of said apparatus.
12. A system as in claim 1 wherein said first control means is a microprocessor.
- 15 13. A system as in any one of the above claims wherein said second control means is a computer server.
14. A system as in claim 10 wherein said information is a home page on said server.
- 20 15. A management apparatus for electrical apparatus including:
 - a sensor on said apparatus communicating information about said apparatus to a microprocessor;
 - said microprocessor adapted to communicate with a server, said server accessible through the Internet and having a homepage which changes based on received and analysed operation of said apparatus and which enables control of said apparatus.
- 25 16. A household electrical appliance controller including;
 - a controller associated with each said appliance providing status and control information of each electrical appliance;
 - said controller adapted to communicate with a server accessible through the Internet, said server including a homepage displaying said
 - 30 status information and enabling control of said electrical appliance through said controller.

17. A method of monitoring and controlling a plurality of apparatus through the Internet including:

5 controlling and monitoring said apparatus by a microprocessor,
 accessing said microprocessor through a communication network
 from a server accessible on the Internet;

 providing said server with a homepage with updated information
 from said microprocessor; and

10 changing said homepage which results in said server
 communicating said change to said microprocessor which in turn
 changes said status of said apparatus.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 49336PCT DL/REC	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/AU 99/00576	International filing date (<i>day/month/year</i>) 16 July 1999	(Earliest) Priority Date (<i>day/month/year</i>) 16 July 1998
Applicant United Technology Pty Ltd et al.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (See Box II).

4. With regard to the title, ☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract, ☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure

☐ because this figure better characterizes the invention

☐ None of the figures

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 99/00576

A. CLASSIFICATION OF SUBJECT MATTERInt Cl⁶: G05B 15/00, G05B 19/418, G08C 19/00.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: G05B 15/—, 19/—, G06F 17/60, G08C 17/—, 19/—, H04Q 9/—.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU: IPC AS ABOVE.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPAT: internet/web/www/server/webserver/homepage/webpage,remote,first/second+controller/controllers

INSPEC: " " " "

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 36117/97 (Lextron Inc) 5 March 1998.	1-17
X	EP 825506 (Foxboro Corp) 25 February 1998.	1-17
X	EP 822473 (Canon Kabushiki Kaisha) 4 February 1998.	1-17
X	WO 96/36953 (P-Serv Technologies) 21 November 1996.	1-17
X	WO 96/18982 (Delaney) 20 June 1996.	1-5, 7-13

☐ Further documents are listed in the continuation of Box C

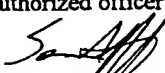
☒ See patent family annex

<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>		<p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search
18 July 1999

Date of mailing of the international search report
20 AUG 1999

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/AU 99/00576

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member			
AU 36117/97	CA 2214238				
WO 96/18982	US 5541589				
EP 822473	JP 10097966	JP 11015520			
WO 96/36953	AU 57868/96	CN 1185852	DE 19681402	SG 45097	
					END OF ANNEX